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THE
BRITISH JOURNAL
Photographic Almanac
1933



64 Gravure Pictures

HENRY GREENWOOD & CO., LTD., *Publishers*

The Royal Photographic Society.

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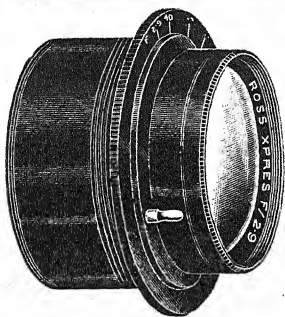
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31685 THE ROSS XPRES LENS

These lenses are the finest example of modern most ultra rapid lenses. Cinematograph, Reflex, Focal Plane and Press Photographers will find them invaluable. A distinctive feature of F/3.5 lens is its wide angle of view.

PRICES. ROSS XPRES LENS, f/1.9

770.5
B.J.P.A.

Equiv. Focus		Plate Covered	Flange Size	In Iris Setting	Code Word Iris Setting	Flange Size	In Focussing Jacket	Code Word Focussing Mounts
mm.	in.	mm.	in.	£ s. d.		in.	£ s. d.	
25	1	16 × 12	1 1/8	10 0 0	Yeda	1 3/8	11 0 0	Yedaf
38	1 1/2	1 × 3/4	1 1/4	10 10 0	Yefe	1 1/2	12 0 0	Yefef
50	2	1 × 1	1 1/2	11 0 0	Yegi	1 5/8	12 15 0	Yegifo
75	3	2 1/2 × 1 1/2	2	13 0 0	Yeho	2 1/4	15 0 0	Yehof

ROSS XPRES LENS, f/2.9

Equiv. Focus		Plate Covered	Price Iris or Sunk Setting	Code Word Iris Setting	Price in Focussing Mounts	Code Word Focussing Mounts
mm.	in.	in.	£ s. d.		£ s. d.	
25	1	16 × 12 mm.	8 10 0	Zuabo	—	—
50	2	1 × 3/4	9 0 0	Zuace	10 10 0	Zuac
62	2 1/2	1 × 1	9 15 0	Zuadi	11 5 0	Zuaid
75	3	2 1/2 × 1 1/2	10 10 0	Zuaf	12 0 0	Zuaf
144	5 3/4	3 1/2 × 2 1/2 & 4 1/2 × 3 1/2	15 10 0	Zubal	18 0 0	Zubla
165	6 1/2	4 1/2 × 3 1/2 & 5 × 4	17 10 0	Zucem	21 0 0	Zucme
215	8 1/2	5 × 4 & 6 1/2 × 4 1/2	25 0 0	Zudin	—	—
254	10	6 1/2 × 4 1/2	35 0 0	Zufop	—	—

ROSS XPRES LENS, f/3.5

Equiv. Focus		Plate Covered	Price in Iris or Sunk Setting	Code Word Iris Setting	Price in Focussing Mounts	Code Word Focussing Mounts
mm.	in.	in.	£ s. d.		£ s. d.	
38	1 1/2	1 × 3/4	6 10 0	Zabse	7 12 6	Zebune
50	2	1 × 1	6 10 0	Zenar	7 12 6	Zecto
75	3	1 1/2 × 1	7 10 0	Zecuno	8 12 6	Zoton
90	3 1/2	2 × 1 1/2	8 0 0	Zecupa	9 10 0	Zotup
100	4	2 1/2 × 1 1/2	9 0 0	Zedan	11 0 0	Zedna
112	4 1/2	3 × 2 1/2	10 0 0	Zefep	12 5 0	Zefpe
136	5 1/2	4 1/2 × 3 1/2	11 10 0	Zegir	13 15 0	Zegsi
152	6	4 1/2 × 3 1/2	12 15 0	Zehos	15 5 0	Zehfto
165	6 1/2	5 × 4	14 0 0	Zejut	—	—
184	7 1/2	5 1/2 × 3 1/2	16 0 0	Zekav	—	—
254	10	6 1/2 × 4 1/2	30 0 0	Zelew	—	—

In sunk settings for Reflex Cameras at same price as ordinary mounts.
The Special Focussing Mounts are for Hand Cameras of fixed extension.
They do not admit of between-lens Shutters.
Cost of pairing lenses for Stereoscopic work, 15/-.





THE ROSS XPRES LENS

The Ross Xpres F/4.5 lens combines extreme speed with a quality of definition unequalled in lenses of the same aperture. Its critical definition at full aperture is maintained over the whole of the plate. Faults usually associated with similar lenses such as Ghost, Flare and Coma are totally absent.

PRICES. ROSS XPRES LENS, f/4.5

Equiv. Focus mm. in.		Plate Covered	Price in Iris or Sunk Setting	Code Word Iris Setting	Price in Focussing Mounts	Code Word Focussing Mounts
			£ s. d.		£ s. d.	
75	3	2 5/16 x 1 3/4	6 5 0	Xasal		
90	3 1/2	3 1/2 x 2 1/4	6 5 0	Xama		
105	4 1/4	3 1/2 x 2 1/4	7 0 0	Xanaf		
112	4 3/8	3 1/2 x 2 1/4	7 0 0	Xapel		
120	4 7/8	3 1/2 x 2 1/4	7 0 0	Xalas	8 15 0	Xeptre
127	5	4 x 3	7 10 0	Xaqes	8 15 0	Xartra
136	5 3/8	4 1/4 x 3 1/4	7 10 0	Xeros	9 10 0	Xestree
140	5 1/2	4 1/4 x 3 1/4	7 10 0	Xemes	9 10 0	Xemtred
152	6	5 x 4	8 10 0	Xines	10 15 0	Xintrop
165	6 1/2	5 1/2 x 3 1/2	10 0 0	Xopos	12 5 0	Xoptemp
184	7 1/4	6 1/2 x 4 1/2	11 0 0	Xugus	13 10 0	Xuqtrrow
215	8 1/2	7 x 5	14 10 0	Xares		
254	10	8 x 5	20 0 0	Xesis		
305	12	8 1/2 x 6 1/2	29 0 0	Xitos		
360	14	10 x 8	40 0 0	Xusic		
420	16 1/2	10 x 8	50 0 0	Xovus		
533	21	12 x 10	75 0 0	Xuras		

In sunk settings for Reflex Cameras at same price as ordinary mounts.

The Special Focussing Mounts are for Hand Cameras of fixed extension.

They do not admit of between-lens Shutters.

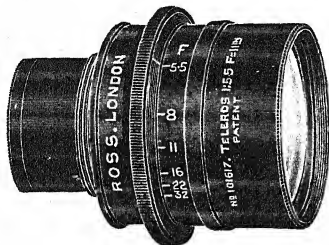
Cost of pairing lenses for Stereoscopic work, 15/-.

THE f/4 WIDE ANGLE ROSS XPRES LENS.

The angle embraced by this lens is 80° and the definition is maintained from centre to margin at full aperture. Designed for special aerial surveying, it is eminently suitable for all classes of work where critical definition, together with large aperture and great covering power are required.

Equiv. Focus	Plate Covered at Full Aperture	Price	Code Word Iris Setting	Code Word In Special Mounts with Long Screw threads and Clamping Flanges
in.	in.	£ s. d.		
5	5 x 4 or 6 1/2 x 4 3/8	14 0 0	Wafs	Wafaf
6	6 1/2 x 4 3/8 or 8 x 5	15 10 0	Wags	Wagaf
7	7 x 7 or 8 x 5	21 0 0	Wais	Wafaf
8 1/2	9 x 7	24 10 0	Wals	Walaf
10	10 x 8	33 0 0	Wams	Wamaf
12	12 x 10	46 0 0	Waps	Wapaf
14	15 x 12	67 0 0	Wars	Waraf
20	22 x 18	125 0 0	Wass	Wasaf

THE ROSS TELEROS LENSES



These lenses can definitely be claimed to be the finest of their type. The Teleros F/5.5 (Two Power) and F/6.3 (Three Power) give an image rather more than twice or three times as large respectively as that of an ordinary lens from the same viewpoint. Giving critical definition they are perfect for high speed photography of inaccessible objects and those difficult to approach.

PRICES. ROSS TELEROS LENS, f/5.5 (Two Power)

Equiv. Focus	Size Plate	Flange Inside dia.	Length Over-all	Infinity Back Cell to Screen	Back Cell to Flange	Price in Iris Setting	Code Word
6½ in.	2 5/16 × 1 3/8	1 1/8 in.	1 15/16 in.	3 1/8 in.	1 1/8 in.	10 0 0	Tilau
9 "	3 1/4 × 2 1/8	1 1/8 "	2 1/8 "	4 1/8 "	1 1/8 "	11 10 0	Tilba
11 "	4 1/4 × 3 1/8	1 1/8 "	3 1/8 "	5 1/8 "	1 1/8 "	14 0 0	Tilce
12 "	5 × 4	1 1/8 "	3 7/8 "	5 7/8 "	1 1/8 "	15 5 0	Tildi
13 "	5 1/4 × 3 3/8	2 "	3 7/8 "	6 1/8 "	1 1/8 "	16 15 0	Tilfo
17 "	6 1/4 × 4 1/8	2 1/8 "	4 1/8 "	8 "	1 1/8 "	27 10 0	Tilgu
22 "	8 1/4 × 6 1/8	3 "	6 1/8 "	10 "	2 1/8 "	47 0 0	Tilhe
40 " f/8	8 1/4 × 6 1/8	3 1/8 "	10 1/8 "	20 "	3 1/8 "	85 0 0	Tilji

Teleros Lenses in Iris Settings with threaded back cells for screwing into shutters.

Mounted in Focussing Settings.

Equiv. Focus	Flange Sizes	Price	Code Word
*4 in.	1 1/8 in.	£ 8 10 0	Tilica
6 1/4 "	1 1/8 "	12 10 0	Tilau
9 "	1 1/8 "	14 0 0	Tilhas
11 "	2 "	17 10 0	Tiljes
12 "	2 1/8 "	18 15 0	Tilkis
13 "	2 1/8 "	20 5 0	Tillos

Equiv. Focus	Compur
6 1/4 in.	No. 00-0
9 "	" 05
11 "	" 1S
12 "	" 1S
13 "	" 2-4/1
17 "	" 3-6/1

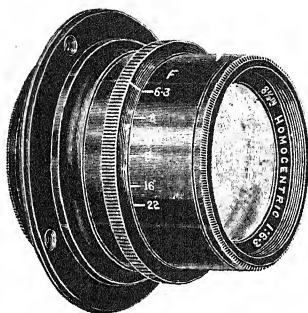
* In Leica Setting, complete with hinged finder mask.

ROSS TELEROS LENS, f/6.3 (Three Power).

Equiv. Foc.	Plate Covered	Flange Inside Dia.	Length Over-all	Infinity Back Cell to Screen	Back Cell to Flange	Price in Iris Setting	Code Words	Shutters Suitable
ins.	ins.	ins.	ins.	ins.	ins.	£ s. d.		
9	2 1/4 × 1 1/2	1 1/8	3 3/8	3 3/8	1 1/8	11 10 0	Triras	1 Compur
13	3 1/4 × 2 1/8	1 1/8	4 1/8	4 1/8	1 1/8	14 10 0	Trirer	2/5 "
17	4 1/4 × 3 1/8	2	5 1/8	6 1/8	1 1/8	22 0 0	Tririu	4 compound
25	6 1/4 × 4 1/8	2 1/8	8 1/8	8 1/8	1 1/8	47 0 0	Tririv	5 "

Prices in focussing settings on application.





THE ROSS HOMOCENTRIC LENSES

The Homocentric Lenses are excellent anastigmats, suitable for practically all branches of photography. The smaller sizes are most popular for small hand cameras. The single components of the F/6.3 and F/8 lenses give very good results with a medium stop.

PRICES.

ROSS HOMOCENTRIC LENS, f/6.3

Equiv. Focus		Plate Covered		Flange Sizes	Price in Iris Setting	Code Word
		Full Aperture	Medium Stops			
mm.	in.	in.	in.	in.	£ s. d.	
127	5	$4\frac{1}{2} \times 3\frac{1}{2}$	5×4	$1\frac{1}{2}$	5 10 0	Heath
140	$5\frac{1}{2}$	$4\frac{1}{2} \times 3\frac{1}{2}$	6×5	$1\frac{1}{2}$	5 15 0	Hebra
152	6	5×4	$6\frac{1}{2} \times 4\frac{1}{2}$	$1\frac{1}{2}$	6 2 6	Hector
165	$6\frac{1}{2}$	$5\frac{1}{2} \times 3\frac{1}{2}$	7×5	$1\frac{1}{2}$	6 12 6	Hecat
178	7	$6\frac{1}{2} \times 4\frac{1}{2}$	$7\frac{1}{2} \times 5$	$1\frac{1}{2}$	7 2 6	Hedon
218	$8\frac{1}{2}$	$7\frac{1}{2} \times 5$	$8\frac{1}{2} \times 6\frac{1}{2}$	2	9 2 6	Heeg
254	10	$8\frac{1}{2} \times 6\frac{1}{2}$	10×8	$2\frac{1}{2}$	12 15 0	Hefra
305	12	10×8	12×10	$2\frac{1}{2}$	18 15 0	Hegron
380	15	12×10	15×12	$3\frac{1}{2}$	26 5 0	Hehlor

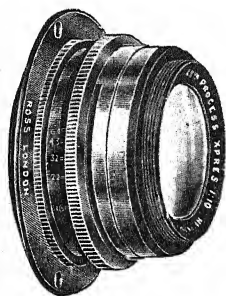
ROSS HOMOCENTRIC LENS, f/8

Equiv. Focus		Plate Covered		Flange Sizes	Price in Iris Setting	Code Word
		From	To			
mm.	in.	in.	in.	in.	£ s. d.	
178	7	$6\frac{1}{2} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	$1\frac{1}{2}$	6 15 0	Hida
218	$8\frac{1}{2}$	$7\frac{1}{2} \times 5$	10×8	$1\frac{1}{2}$	8 5 0	Hiendel
254	10	$8\frac{1}{2} \times 6\frac{1}{2}$	12×10	2	11 0 0	Hiffar
305	12	10×8	15×12	$2\frac{1}{2}$	15 0 0	Higor
380	15	12×10	18×16	$2\frac{1}{2}$	20 0 0	Hihone
455	18	13×11	22×18	$3\frac{1}{2}$	28 0 0	Hikur
533	21	15×12	25×22	$3\frac{1}{2}$	37 0 0	Hileh
610	24	18×16	30×24	4	47 0 0	Himal

Special Focussing Mounts, provided with Iris Diaphragms, are supplied at a small extra cost for use with Cameras of fixed extension. These special mounts do not admit of between-lens shutters.

Cost of pairing two Lenses for Stereoscopic Work, 15/-.





THE ROSS PROCESS XPRES LENS AND REVERSING PRISMS FOR LINE, HALF-TONE AND THREE-COLOUR WORK.

The Process Xpres Lens has been specially designed to meet the most exacting requirements of all branches of modern process work. It is unrivalled for three-colour photography and the finest line and half-tone work.

PRICES.

Focus		Aperture	Plate covered at full aperture copying same size	Price	Code Word	Prism No.
mm.	ins.			£ s. d.		
330	13	F 9	13 × 9	15 0 0	Phaba	1
406	16	F 10	15 × 12	20 0 0	Phace	1a
480	18	F 10	18 × 13	24 0 0	Phadi	2
530	21	F 10	20 × 16	28 0 0	Phafo	3
635	25	F 10	25 × 18	38 0 0	Phagu	4
760	30	F 16	30 × 20	48 0 0	Phahe	4
914	36	F 16	36 × 24	68 0 0	Phaje	5
1066	42	F 16	40 × 30	87 0 0	Pheli	6
1130	48	F 16	45 × 36	110 0 0	Phemo	6

If a Lens is required with a Reversing Prism add the letter "P" to code-word for Lens.

ROSS REVERSING PRISMS for Photo-Mechanical Work.

These Prisms are made of carefully annealed colourless crown glass and are accurately rectangular. The mount of the Prism screws directly to the hood of the lens, bringing one of the non-reflecting surfaces close up to the front lens. The Prism is thus used to full advantage. The Hypotenuse surfaces are silvered to ensure complete reflection. To obtain accurate centering it is necessary to send your lens when ordering.

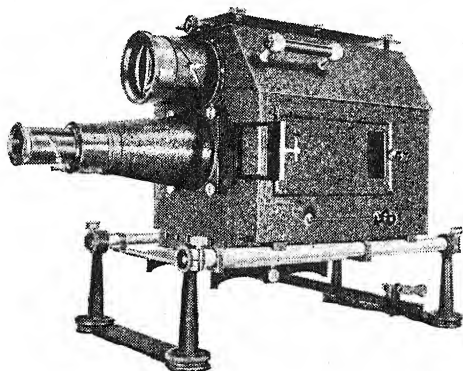
PRICES of Prisms mounted in Metal Box with revolving collar.

No.	Length and Breadth of non-reflecting surfaces		Price		Code Word
	ins.	mm.	£	s. d.	
1	2½	65	15	0 0	Promote
1a	2½	70	22	0 0	Promost
2	3	75	26	0 0	Promont
3	3½	80	30	0 0	Promove
4	3½	90	38	0 0	Prompt

Prices for Apochromatic Lens of similar foci for colour work and Prisms of larger size on application.



THE ROSS EPIDIASCOPE



THE vast experience of Ross Ltd. has enabled them to produce a most efficient Epidiascope at a reasonable price, and embodying many exclusive features which place this instrument in a class by itself.

The lenses are of the finest optical quality and give perfect definition. A new system of illumination and ventilation enables the most valuable and delicate specimens to be shown without fear of damage by heat.

Opaque objects and lantern slides are projected with equal brilliance, whilst the placing and withdrawing of opaque objects is most easily effected.

The change over from episcopic to diascopic projection is very simple and effected almost immediately.

A metal pointer with universal adjustment allows the lecturer to draw attention to any part of the object shown whilst still operating the instrument.

When the instrument is tilted, critical definition is easily secured by the adjustment of a screw on the front of the Lamphouse.

THE PRICE

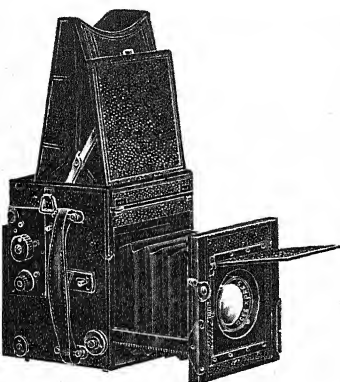
"Ross" Epidiascope with Condensers, Mirrors, $10\frac{1}{2}$ ins. focus large aperture diascopic and 17 ins. ditto episcopic projection lenses, Slide Carrier for either English or Continental size lantern slides, Table Stand, complete but without projection Lamp is

£35 10 0

Extra for :	500-Watts Lamp	£1 5 0
	1000-Watts Lamp	£1 12 0

Descriptive and illustrated booklet sent post free on application





THE ROSS STANDARD REFLEX CAMERA

This camera is of the highest quality and best workmanship throughout. It is fitted with every adjustment necessary for the finest reflex work but has no elaborate and unnecessary movements to complicate the working of the camera and get out of order.

Among several special features is the focal-plane shutter. With this shutter the various speeds are obtained by simply altering the width of the slit. Complete details and specification on application.

PRICES.

	3½ × 2½ 5 in. lens	½-plate 5½ in. lens	Post-card Size, 6 in. lens	5½ × 3½ with Stereo attach- ment and 2 5 in. lenses	5 × 4 6 in. lens	½-plate 8½ in. lens
Camera with 3 Solid Slides, no lens	£ s. d. 23 10 0	£ s. d. 23 10 0	£ s. d. 27 0 0	£ s. d. 30 0 0	£ s. d. 30 0 0	£ s. d. 40 0 0
With Ross	5½" lens	6½" lens				
Xpres, f/2.9	39 0 0	41 0 0				
Code Words	Minilex	Refbex				
With Ross	5½" lens	6½" lens	6½" lens		7½" lens	10" lens
Xpres, f/3.5	35 0 0	37 10 0	41 0 0		46 0 0	70 0 0
Code Words	Minimop	Refjut	Refjas		Refkav	Refliy
With Ross	4½" lens		6½" lens		6½" lens	
Xpres, f/4.5	30 10 0	31 0 0	37 0 0	45 15 0	40 0 0	54 10 0
Code Words	Minleg	Refule	Refews	Reflock	Refnok	Refnole
With Ross						
Homocentric Lens, f/6.3	29 0 0	29 5 0	33 2 6	41 15 0	36 2 6	49 2 6
Code Words	Miniflap	Reflap	Reflate	Refster	Refloor	Refloat
Solid D.D. Slides, each	0 15 0	0 15 0	0 18 6	0 18 6	0 18 6	1 7 6
Book-Form Slides, each	1 10 0	1 10 0	2 0 0	2 0 0	2 0 0	2 10 0
For Swing Front, extra	3 8 6	3 8 6	3 15 0	3 15 0	4 5 0	4 15 0
Changing Box for 12 plates	4 5 0	4 5 0	5 0 0	5 0 0	5 0 0	5 17 0
Film-pack						
Adapter	1 15 0	1 15 0	2 2 6	2 2 6	2 2 6	2 16 0
Antinous						
Release, extra	0 5 6	0 5 6	0 5 6	0 5 6	0 5 6	0 5 6

New Shutter Release Time Valve, 40/-.

Stereo Focussing Magnifier, fits hoods of all cameras, £1 1s. 0d.

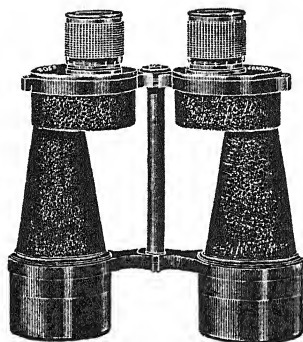
The post-card size cameras are not fitted with reversing back.

Leather Cases for any outfit to order.

Prices for Continental sizes post free on application.



ROSS EXTRA WIDE FIELD



STEREO PRISM BINOCULAR

MAGNIFICATION 7 DIAMETERS "STEPNITE"

STEPNITE" has been specially designed for use at dusk and for observation at night.

The light transmitting power is very greatly in excess of that of any prism binocular previously made, and by reason of large prisms and lenses and eyepieces of special design, the illumination at margins of field is 137 per cent. greater than that obtained with other binoculars of the same power and aperture. Further, the central illumination is fully 20 per cent. greater and the perfect definition is maintained over practically the whole field, whereas in other types of binoculars the definition falls off rapidly towards the margins of field. These qualities of great luminosity and critical definition at margins of field make this binocular unsurpassable for the use of officers of the Navy and Mercantile Marine, Yachtsmen, Huntsmen, Sportsmen, Surveyors and others.

With "Stepnite" objects can be picked up and clearly seen immediately they enter the field of vision, whereas generally these objects escape notice altogether.

Effective diameter of	Stereoscopic Power	14
Object Glasses 50 mm.	Weight of Binocular	34 oz.
Real Field of View	Price	£21 10 0
Linear per 1,000 yards	Code Word	"Stepnite"
Description and Illustrated booklet of other models and of telescopes post free on request.		

Showrooms:—13-14 Great Castle Street, Oxford Circus, W.1.



“N & G”

ROLL FILM “SIBYL” CAMERAS

$4\frac{1}{2} \times 6$ c/m, “BABY SIBYL.”

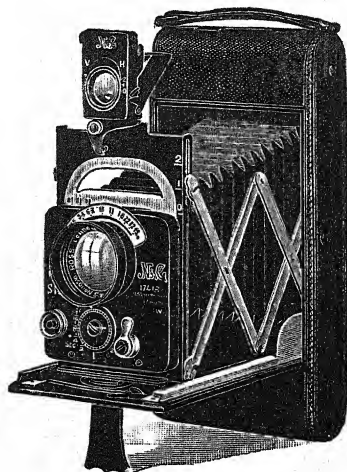
$3\frac{1}{4} \times 2\frac{1}{4}$ ins., “NEW SPECIAL.”

$\frac{1}{4}$ plate, “NEW IDEAL.”

$4\frac{1}{4} \times 2\frac{1}{2}$ ins., “EXCELSIOR.”

Owing to the increasing popularity of Roll Film Cameras, we beg to announce a reduction in price of all Roll Film “SIBYL” models.

*Complete Catalogue of Cameras
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“Sibyl Excelsior.”

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For Plates and Film Packs or Roll Films.

THE "BABY SIBYL." $4\frac{1}{2} \times 6\frac{1}{2}$ c.m.

THE "NEW SPECIAL" and "SIBYL VITESSE" $3\frac{1}{2}$ in. \times $2\frac{1}{2}$ in. or $6\frac{1}{2} \times 9$ c.m.

The NEW IDEAL $\frac{1}{2}$ plate.

The "SIBYL EXCELSIOR" Roll Film. $4\frac{1}{2}$ in. \times $2\frac{1}{2}$ in.

All "SIBYL" Models are fitted with lenses of F4.5 aperture, except the "Vitesse," which is fitted with F3.5 lens.

They are LIGHT, COMPACT and ACCURATE, are of all metal construction, covered in the best Morocco Leather, with finest leather Bellows.

THE "N & G" HIGH PRECISION SHUTTER. An exclusive "SIBYL" feature. Every speed is guaranteed correct to within 10% of scale. The range of speeds is from $\frac{1}{2}$ to $\frac{1}{200}$ th of a second, on Baby "Sibyl" models; $\frac{1}{4}$ to $\frac{1}{150}$ on $3\frac{1}{2}$ in. \times $2\frac{1}{2}$ in. models; and $\frac{1}{2}$ to $\frac{1}{100}$ th on the $\frac{1}{2}$ plate models. Also time and bulb movements.

THE SHUTTER on the new "EXCELSIOR" and "VITESSE" models is of "N & G" design, embodying new principles, giving a unique range of Accurate Speeds from 2 Seconds to $\frac{1}{150}$ th second; also positive Ball and Time movements when shutter is set at any speed.

FOCUSING. — "N & G" patent lever focussing is fitted to all "Sibyl" models, all distances are individually scribed for each Camera, are well separated, and clearly engraved in yards.

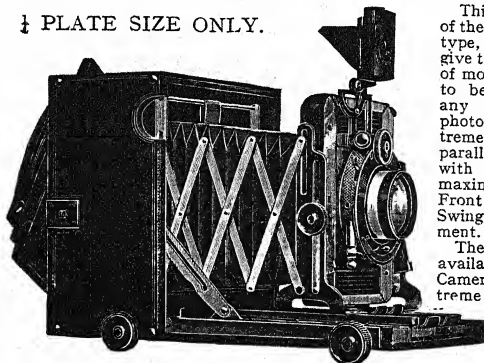
THE "N & G" PATENT FOLDING REFLECTOR FINDER is fitted to all "Sibyl" models, save only the "Baby Sibyl" plate model. This finder has a sliding lens, accurately scaled to show rising front, and is fitted with levels.

FULL RISING FRONT, both horizontal and vertical, is provided on all models.

TELE-PHOTO LENSES of the Dallmeyer "Dallon" and Ross "Teleros" type can be fitted to all "Sibyl" models.

"TRELLIS" CAMERA.

$\frac{1}{2}$ PLATE SIZE ONLY.



This apparatus is of the Hand or Stand type, designed to give the fullest range of movements likely to be required for any description of photography. Extreme rigidity and parallelism of front with plate. The maximum of Rising Front and Central Swing Front movement.

The extension available on this Camera, and the extreme rigidity of same as a whole, at all positions, are its special features.

Price of "N & G" "Trellis" Camera, complete with three double dark slides, but without Lens or Shutter, $\frac{1}{2}$ plate...
Camera, complete with three double dark slides, fitted with "N & G" "Excelsior" Shutter and No. 7 Ross Combinable Lens—6" and $10\frac{1}{4}$ " foci

£20 0 0

47 0 0

"N & G"

**PATENT
FOLDING REFLEX.**

Manufactured in Two
Models:—

SPECIAL. F/2.9 and
F/3.5 Lenses.

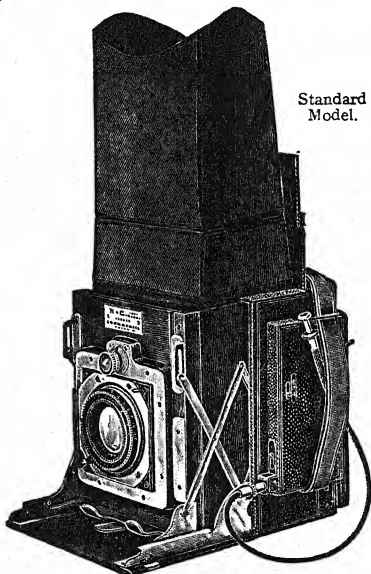
STANDARD. F/4.5
Lenses.

ONE SIZE ONLY.

$3\frac{1}{2}" \times 2\frac{1}{2}"$ or $6\frac{1}{2} \times 9$ c.m.

The product of over
thirty years' experience
in the design and con-
struction of the best.

The Camera is finished
in the usual "N & G"
style; to previous users of
our apparatus no more
need be said, it is simple and
straightforward to manip-
ulate and still remains by
far the most practical and
successful Folding Reflex
on the market.



CAMERA OPEN.—Is as rigid as a Box Form Reflex. Focussing by means of focussing mount on each lens supplied. The camera is entirely self-contained with no projections, a long handle being provided.

SHUTTER.—The "N & G" Self-capping, quick wind focal plane shutter is fitted. Speeds from 1/10 to 1/800th of a second, with ball and time.

THE MIRROR is very light, free from noise and vibration; all movements are of the finest steel to eliminate wear.

THE RELEASE is on left side of camera, leaving right hand free for focussing, and is delicate, yet positive. Antinous or pneumatic releases can be supplied.

THE REVOLVING BACK is adapted to take either "N & G" double book-form metal slides, "N & G" film pack adapter, roll holder, or "N & G" changing boxes.

RIISING, FALLING AND HORIZONTAL SWING FRONT movements are provided in Standard Model only.

LENSES.—Only the highest grade **British Lenses** are fitted of F/4.5 aperture, and $5\frac{1}{4}$ in. focal length in the Standard Model, and F/2.9 and F/3.5 of approx: $5\frac{1}{4}$ in., in the Special Model. These are quickly interchangeable with large aperture fixed focus telephoto lenses, of the Ross F/5.5 "Teleros" and Dallmeyer F/5.6 "Dallon" type, by means of the "N & G" quick change lens flange.

MAGNIFIER LENSES in hood, folding inside. A Tripod Bush is provided. The Standard Model weighs only 3 lbs. 8 ozs., complete with F/4.5 lens. Duralumin body-work, and in other parts where possible, the Camera is absolutely climate proof.

PRICES. PATENT FOLDING REFLEX.

Camera complete with 3 "N & G" Double Metal Book Form Dark Slides. Dark Slide Adapter, and Hooded Focussing Screen.

STANDARD MODEL.

	£	s.	d.
Fitted with Ross F/4.5 Xpres Lens, 5½ in. ...	47	10	0
Fitted with Dallmeyer F/4.5 Serrac Lens, 5½ in. ...	47	0	0
Dallmeyer F/5.6 Dallon Telephoto Lens, 10 in. focus ...	15	10	0
Ross F/5.5 Teleros Lens, 11 in. focus ...	18	5	0

SPECIAL MODEL.

Fitted with Ross F/2.9 Xpres Lens, 5½ in. ...	57	0	0
Fitted with Dallmeyer F/2.9 Pentac Lens, 5½ ins. ...	56	0	0
Fitted with Ross F/3.5 Xpres Lens, 5½ in. ...	53	0	0
Fitted with Dallmeyer F/3.5 Dalmac Lens, 6 in. ...	51	0	0
Ross F/5.5 Teleros Lens, 11 in. focus ...	18	10	0
Dallmeyer F/5.6 Dallon Telephoto Lens, 10 in. focus ...	15	15	0

"SIBYL" CAMERAS.

PLATE MODELS, complete with 3 "N & G" Metal Double Dark Slides and Focussing Screen.

Lens.	Baby 4½ × 6 c/m	New Special 3½ × 2½ or 6½ × 9 c/m	New Ideal ½-plate or 4½ × 3½
Ross F4.5 Xpres ...	£19 5 0	£23 0 0	Double
T.T. and H. F4.5 Sibyl Aviar ...	19 5 0	—	Dark Slides
Dallmeyer F4.5 Serrac ...	18 10 0	22 5 0	cannot
Wray F4.5 Lustrar ...	17 10 0	21 5 0	be supplied.

The New "Sibyl Vitesse." 3½ × 2½ in. or 6½ × 9 c/m.

Ross F.3.5 Xpres Lens...	£30 0 0
Dallmeyer F3.5 Dalmac Lens...	28 10 0

PLATE MODELS, complete with 6 Single Metal Dark Slides, instead of Double Dark Slides.

Ross F4.5 Xpres ...	Single Dark Slide	£21 10 0	£25 0 0
T.T. and H. F4.5 Sibyl Aviar ...	cannot	—	25 0 0
Dallmeyer F4.5 Serrac ...	be supplied	20 10 0	24 5 0
Wray F4.5 Lustrar ...		19 10 0	23 5 0

ROLL FILM MODELS.

The New "Sibyl Excelsior." 4½ × 2½

Ross F4.5 Xpres ...	£29 10 0
T.T. and H. F4.5 Sibyl Aviar ...	29 10 0
Dallmeyer F4.5 Serrac ...	28 15 0

Lens.	Baby 4½ × 6 c/m	New Special 3½ × 2½ or 6½ × 9 c/m	New Ideal ½-plate or 4½ × 3½
Ross F4.5 Xpres ...	£19 15 0	£23 0 0	£26 0 0
T.T. and H. F4.5 Sibyl Aviar ...	19 15 0	—	26 0 0
Dallmeyer F4.5 Serrac ...	19 0 0	22 5 0	25 5 0
Wray F4.5 Lustrar ...	18 0 0	21 5 0	24 5 0

TELE-PHOTO LENSES for use with "Sibyl" Cameras.

Dallmeyer F6.5 Dallon ...	(5½ in.) £5 10 0	(9 in.) £8 12 6	(10½ in.) £10 10 0
Ross F5.5 Teleros ...	(6½ in.) 10 10 0	(9 in.) 12 5 0	(11 in.) 14 15 0

KODAK



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NEWCASTLE-ON-TYNE. 32 Grainger Street

GLASGOW. 46 Buchanan Street

DUBLIN. 89 Grafton Street

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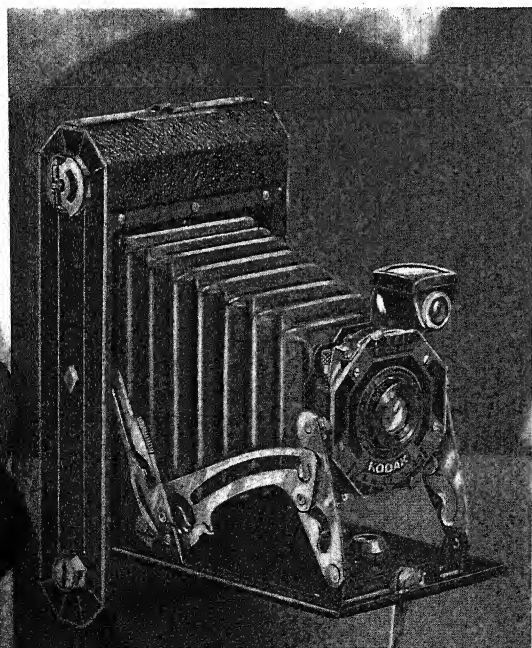
Algeria, Argentine, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Cuba, Czechoslovakia, Denmark, Dutch East Indies, East Africa, Egypt, France, Germany, Greece, Hawaiian Islands, Holland, Hungary, India, Italy, Japan, Jugoslavia, Mexico, New Zealand, Palestine, Panama, Peru, Philippine Islands, Poland, Portugal, Roumania, South Africa, Spain, Straits Settlements, Switzerland, Syria, Turkey, United States, Uruguay.

THE SIX-20 "KODAK"

The smallest "Kodak" taking $3\frac{1}{4}'' \times 2\frac{1}{4}''$ pictures. Incorporates every device to facilitate quick handling and good picture-making. Self Erecting Lens : Hinged Back : Pull-Out Spool Holders : Duplicate Speed and Aperture Markings on top of Shutter. Clearly marked 'Fixed focus' Settings on Focussing Model.

With its clean lines, black glossy enamel and polished nickel finish, and general compactness, the Six-20 unites to its mechanical efficiency a strikingly smart appearance.

Uses "Verichrome" Film No. V620 or Kodak Film No. 620.



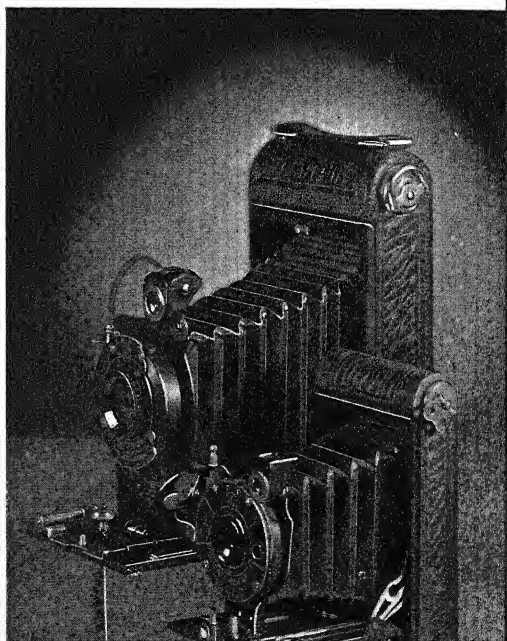
Kodak Ltd.,
Kingsway,
London, W.C.2

VEST POCKET and POCKET "KODAKS"

From the Single Lens Model B, to the $f6.3$ Series III and $f4.5$ Special, all Vest Pocket "Kodaks" are characterised by extreme compactness. Picture size: $2\frac{1}{2} \times 1\frac{5}{8}$ ". Variety of lens and shutter equipments.

Pocket "Kodaks" are inexpensive folding cameras, popular with snapshotters. The fast "Kodak" Anastigmat $f6.3$ lens is available on all models. Picture sizes: $3\frac{1}{4} \times 2\frac{1}{4}$ ", $4\frac{1}{4} \times 2\frac{1}{2}$ ", $5\frac{1}{2} \times 3\frac{1}{4}$ ".

Kodak Ltd.,
Kingsway,
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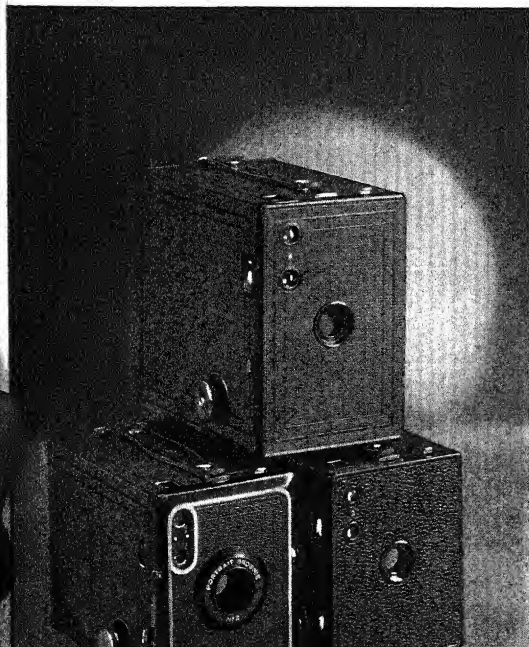
Nos. 2, 2A
and
PORTRAIT
"BROWNIES"

The world-famous box-form cameras. No. 2 ($3\frac{1}{4} \times 2\frac{1}{4}$ "), 2A ($4\frac{1}{4} \times 2\frac{1}{2}$ "), and Portrait ($3\frac{1}{4} \times 2\frac{1}{4}$ "), available in Black and variety of Colours.

The Portrait "Brownie" makes 'close-ups' as well as groups and views. For 'close-ups' simply depress a small lever as you make the picture release the lever and the camera is instantly ready for distant shots.

Prices from

12/6



Kodak Ltd.,
Kingsway,
London, W.C.2

"VERICHROME"

Roll Film and
Film Pack

The
Faster Film—
The
Master Film

Whatever the light—whatever the subject—"Verichrome" definitely gives *better pictures*.

The following impressive array of qualities explains why :

1. Double Coated—Two emulsions, a fast one over a slow, give enormous latitude. "Verichrome" takes care of exposure errors.
2. Double Speed—When light is failing "Verichrome" will still get the picture.
3. Red Backed—Special red backing (which disappears in the developer) prevents all traces of 'fuzziness' round brilliantly-lit objects and ensures crisp rendering of the highest highlights.
4. Highly Orthochromatic — Because of its particular sensitiveness to Greens and Yellows, "Verichrome" is most effective for landscape work.

KODAK FILM

"The Dependable Film in the Yellow Carton" (roll film and film pack) still remains at the photographer's service.



Kodak Ltd.,
Kingsway,
London, W.C.2

CINE- "KODAK" EIGHT- 20

The Ciné-"Kodak" Eight-20 heralds a revolution in amateur cinematography. It will enable thousands who have hitherto been prevented from enjoying the pleasures of motion-picture making by reason of expense to join in the fun. Its secret lies in an ingeniously economical use of film. The film (16 mm. in width) is loaded into the camera and *one half* the width (a strip 8 mm. wide) is exposed. The partially exposed spool is then reversed, reloaded, and the other half exposed. After being processed, the film is slit down the middle and spliced end to end. Each picture is half the width and half the height of an ordinary 16 mm. frame. Result: 25 ft. of 8 mm. film equals 100ft. of 16 mm. film in projection time.



Ciné - "Kodak" Eight-20 is fitted with an *f* 3.5 anastigmat lens. It weighs only 3½ lbs. when loaded, and can easily be carried in a coat pocket. Equipment includes Spring Motor, Footage Indicator, Exposure Guide on front of camera, Direct Vision Viewfinder.

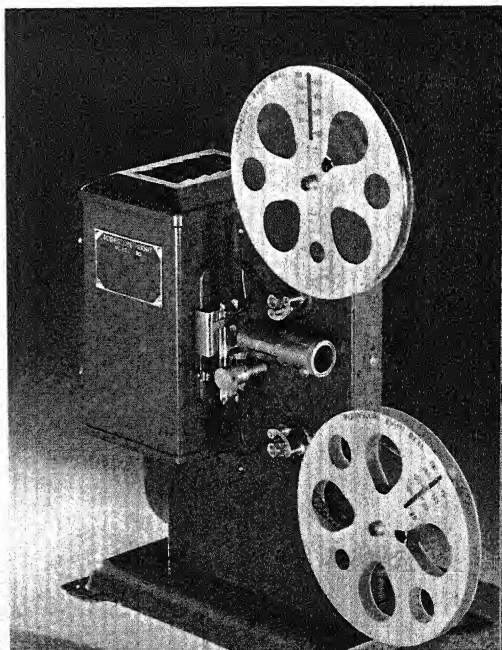
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KODASCOPE EIGHT- 30

The companion projector to the Ciné-
"Kodak" Eight-20. The "Kodascope"
Eight-30 projects a brightly lit picture up to
40"×30". It runs from any house
electric circuit of 100-150 or 200-
250 volts, and accommodates 200
feet of 8 mm. film. A 100 watt lamp is
used to provide direct illumination. A
mica screen comes automatically between
lamp and film when projection speed falls
below a certain level, to protect the emulsion
from damage. Motor-driven rewind.

Although the
frame area on 8mm.
film is only one
quarter that on 16
mm. film, the pro-
jected picture is re-
markably free from
grain. This is due
partly to the special
fine-grain emulsion
of the film and
partly to the rever-
sal process, which
still further reduces
the size of grain.

Kodak Ltd.,
Kingsway,
London, W.C.2



**KODAK
16 mm.
CAMERAS
and
PROJECTORS**

CINÉ-"KODAK"

MODEL BB JUNIOR F3.5 and F1.9.

Lightest, smallest, lowest priced 16mm. Ciné-"Kodak." Holds 50ft. of film. Fitted with *f*3.5 (fixed focus) or fast *f*1.9 (focusing) lens. *F*1.9 model will take "Kodacolor" pictures.

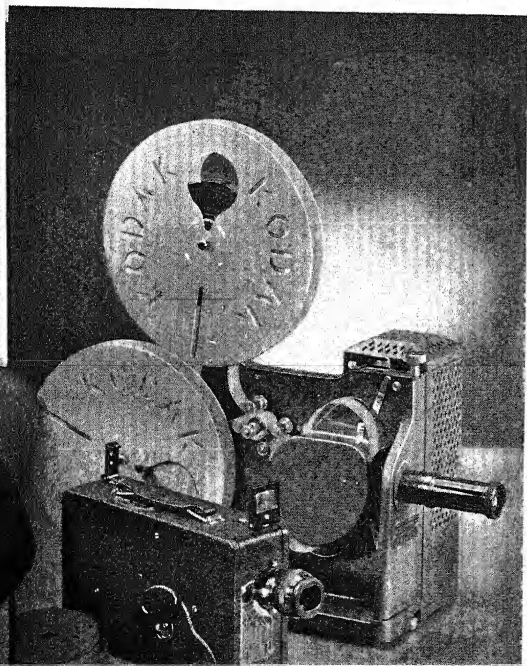
"KODASCOPE" MODEL C

Portable motor driven 16 mm. projector; runs from ordinary house electric circuit. Holds 400 ft. of film; projects 40"×30" picture.

CINÉ-"KODAK" MODEL K

"KODASCOPE" MODEL K

Models with more advanced equipment and a much wider range of usefulness. Full particulars on application.



Kodak Ltd.,
Kingsway,
London, W.C.2

EASTMAN PROFESSIONAL FILMS

A Grade for Every Need

Eastman Portrait Film

Made in two speeds—Par Speed: rapid emulsion suitable for portraiture and all ordinary work, and Super Speed: extremely rapid emulsion for brief exposures in poor light. Double Coated.

Eastman Portrait Panchromatic Film

Two films that combine extremely high speed with complete colour sensitivity.

Eastman Super-sensitive Panchromatic Film

Eastman Portrait Panchromatic Film is evenly sensitive to all colours and therefore recommended for portraiture. Eastman Super-sensitive Panchromatic Film is exceptionally sensitive to red; it is particularly suitable for commercial work.

Eastman Commercial Panchromatic Film

Completely colour sensitive. Useful for commercial work where extremely high speed is not required.

Eastman Commercial Ortho Film

Suitable for all kinds of work requiring general, but not red, sensitiveness.

Eastman Commercial Film

Particularly suitable for copying.

Eastman Process Film

Specially adapted to the needs of the photo-engraver and lithographer.

Eastman Panchromatic Process Film

Particularly suitable for three colour work.

See also "Kodaline" Film (page 30).

KODAK PRINTING PAPERS

"Velox"

The Kodak Gaslight Paper. Made specifically to suit amateurs' negatives. Four grades—Contrast, Vigorous, Medium and Soft—to suit every type of negative; three surfaces—Glossy, Art (Semi-Matt) and Carbon (Matt)—to satisfy every taste.

Look for the name on the back of every sheet.

"Kodatone"

The Kodak Self Toning Paper. Rich sepia tones obtained by using a fixing bath of plain hypo; cool, purple tones by giving a preliminary wash in common salt solution. Made in White and Cream.

Kodak Bromide Papers

A grade for every kind of subject—portraits, landscapes, commercial, press, etc. Most grades are made in Single and Double Weights and three degrees of contrast.

Velvet	Royal Tinted
Platino Matte	Royal White
Smooth	"Fine Grain"
Platino Matte	Royal
Rough	Old Master
"Nikko"	Cream
(Enamelled)	
Permanent	"Finisher"
Smooth	Bromide
Permanent	Kodak Bromoil
Rough	Paper

KODAK PRINTING PAPERS—Cont.

"Kodura"

Gives rich, warm-black tones by direct development. Made in nine grades and in Cream and White base. All grades tone to fine sepia by the Sulphide or Hypo-Alum process.

"Etching Brown"

Warm, brown-black tones are obtained with Etching Brown by development only, lending to the print the rich mellowness of an old engraving. Double Weight only.

Smooth Matte White
Smooth Matte Cream
Rough Matte Cream

"Kothena"

A slow paper that gives a rich, warm-black image by direct development. Because of its extremely long scale of gradation it does full justice to fine quality portrait negatives. Double Weight only.

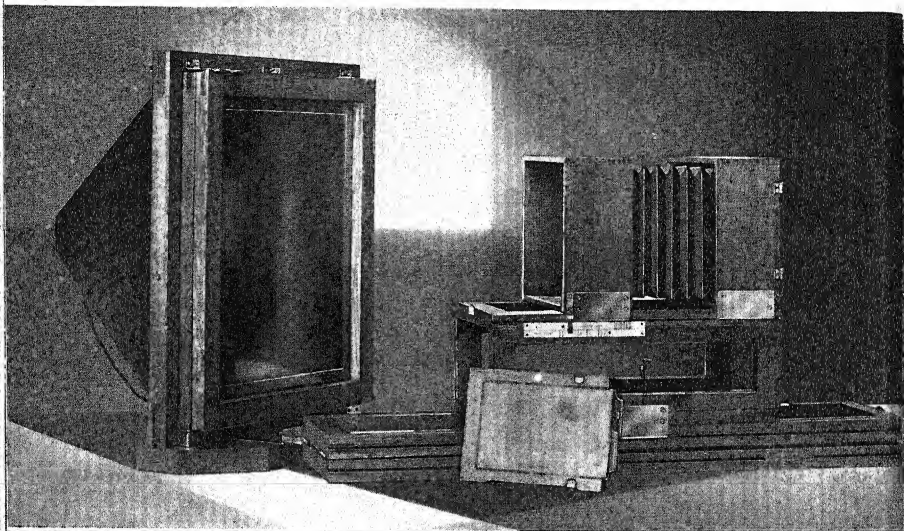
Grade B—White Semi-Matte
Grade C—White Smooth-Matte
Grade E—Smooth Cream Matte

"Kovita"

A warm-black paper of the well-known "Kodura" type, with the additional attraction of being fast enough for enlarging work. Double Weight only.

C—White Matte
E—Cream Matte
N—White Parchment
O—Cream Parchment

KODAK X-RAY REDUCTION CAMERA



Simplifies the reduction of "Dupli-Tized" X-Ray Film negatives (of all sizes up to 17 in. \times 14 in.) to lantern slides, bromide prints and film transparencies of 6½ ins. \times 4¾ ins. or smaller.

With the Camera are included : A Negative Illuminator 17 in. \times 14 in. fitted with metal cone ; Lamp Holder ; 250-watt Lamp ; 10 feet flex and Wall Plug ; Detachable Hinged Film Negative Frame, double glazed ; Set of 8 Masks ; Brass Wire Frame hinged on illuminator and draped with black material to eliminate reflection.

Lens : "Kodak" $f7.9$; Shutter : "Kodex," with iris diaphragm. Automatic focussing scales provided.

Price on application.

Kodak Ltd., Kingsway, London, W.C.2

KODAK CLINICAL CAMERA OUTFIT



The Kodak Clinical Camera Outfit is equipped to do all types of photographic work for medical and surgical use. Following is a brief specification; full particulars will be sent on application.

CAMERA. $6\frac{1}{2}$ in. \times $4\frac{3}{4}$ in., double extension bellows. Rising and falling front; side swing; reversing back. Tilting head; fittings for stereoscopic exposures.

LENS. Kodak Anastigmat f 7.7.

SHUTTER. "Kodamatic." Speeds range from $1/150$ th to $\frac{1}{2}$ second. 'Time' and 'Brief Time' actions.

TRIPOD. Compact and rigid. Maximum extension 47 ins., minimum 28 ins.

TWO FLOOD LIGHTS. 500-watt gas filled lamps in reflectors. One fitted on telescopic stand allowing 7 ft. extension; the other on smaller stand.

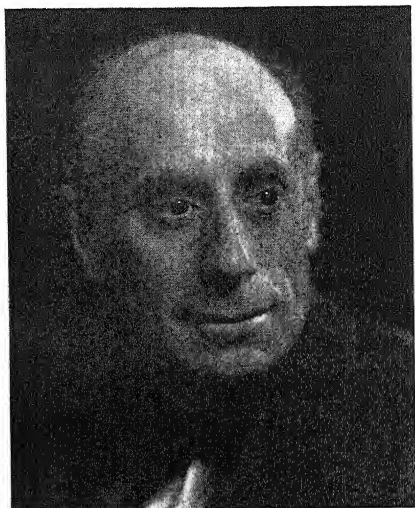
ENLARGING ATTACHMENT. Complete with light chamber, 100-watt lamp, reflector and hinged and glazed negative holder. *Price on application.*

Kodak Ltd, Kingsway, London, W.C.2

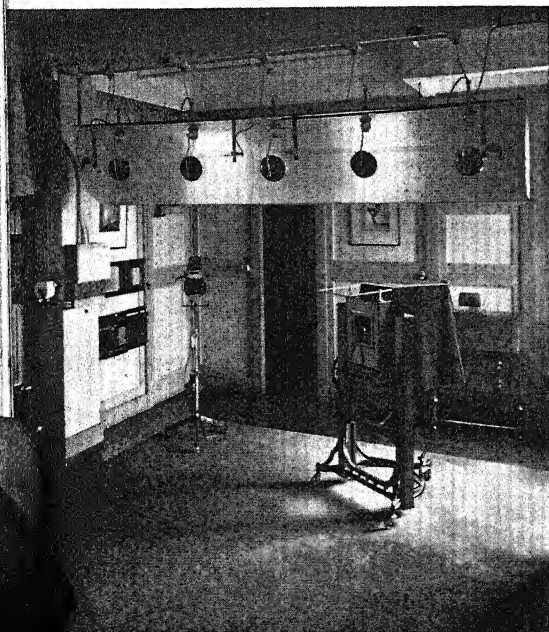
KODAK STUDIO LIGHTING EQUIPMENT

Kodak
Unit
System

1932
P.P.A. Congress
Prize-Winning
Portrait



Taken by Harold B.
Burdekin, Reigate



Kodak Ltd. supply everything connected with studio lighting, from a single lamp to a complete system. Full particulars of the following gladly sent on request:

"Kodalite"

Kodak Focussing
Spotlight

Kodak Unit System
of Studio Lighting

Kodak Head Lamp

"Modelite"
Studio Floodlight

Kodak Ltd.,
Kingsway,
London, W.C.2

Kodak D. & P. Apparatus and Service

Kodak Ltd. supply a complete range of D. & P. apparatus including:

The Kodak D. & P. Clerical and Routine Control System.

D. & P. Counter Order Pads;

Invoice Pads and sundry D. & P. stationery.

Film Developing Apparatus;

Vertical Tanks; Electric Immersion Heaters;

Tank Rods; Kodak Double Clips;

Kodak Self-draining Bottom Clips;

Film Pack Hangers; Plate Cages.

The Kodak Printing Control System;

Film Strip Boxes; Sorting Racks;

Control Tablets, etc.

Kodak Developing, Fixing and Printing Apparatus;

Kodak Rocker Washers; Kodak Rotary Washers.

"Velox" Glazing and Drying Machine and other Finishing Apparatus;

Print Trimmers and Chromium Glazing Plates;

Enlarging, Mounting and Finishing Apparatus.

In addition, Kodak Ltd., provide free service in connection with Organization, Management, Control and Production problems.

Suggestions for re-organization of D. & P. plants and draft layouts with estimates of necessary equipment will be submitted on receipt of details.

"KODALINE" FILM

*A New Sensitive Material for
the Photo-mechanical worker*

"Kodamine" Film meets the increasing demand for a film on a thin base made specifically for photo-mechanical work.

For Contrast, Cleanliness, Fine Grain, Freedom from Halation and Orthochromatic qualities it compares favourably with any other material. It is easy to handle and can be cut with a pair of scissors for the purpose of making composite negatives, etc.

Prices are based on a square foot rate, which makes "Kodamine" competitive and economical, particularly in the larger sizes.

SIZES - PRICES
AND FULL DETAILS
GLADLY GIVEN
ON APPLICATION.

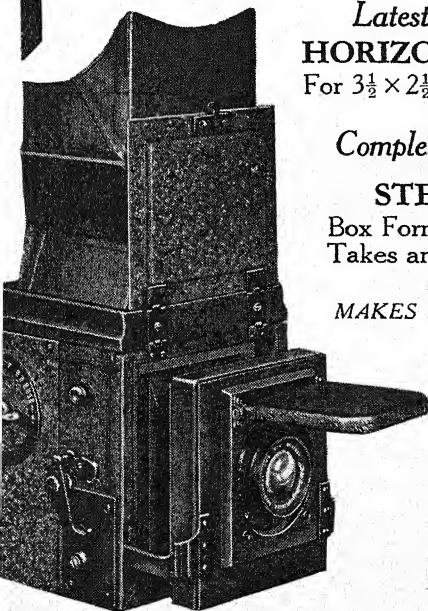
THORNTON-PICKARD

CAMERA CRAFTSMEN *for*
Discriminating Photographers



SPECIALITIES

Field Cameras
Reflex Cameras
Press Cameras
Enlargers



Latest Introductions :-

HORIZONTAL REFLEX

For $3\frac{1}{2} \times 2\frac{1}{2}$ Plates, Film Packs or
Roll Films.

Complete £8. 15. 0.

STEREO PUCK

Box Form Roll Film Camera
Takes any Standard $3\frac{1}{4} \times 2\frac{1}{4}$
Roll Film.

MAKES PICTURES LIVE ! !

21/- *Complete
with Viewer.*

LISTS POST FREE
ANYWHERE.

Factories :
ALTRINCHAM, ENGLAND.

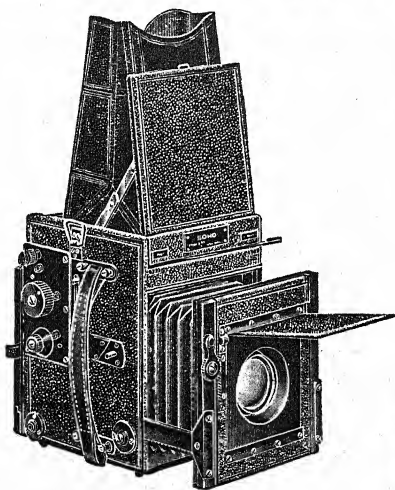
The Best Camera in the World

**Hand-Made by
British Craftsmen**

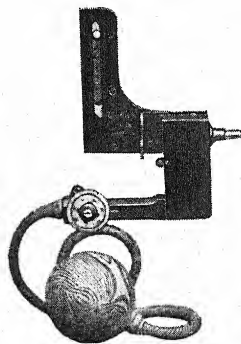
Whatever the name,
whatever the price,
NO other Camera
approaches the

SOHO REFLEX

**The Best Camera in
the World.**



New refinements in the latest model include reversing picture mask fitted in the hood, also a newly-designed Speed indicating Scale to facilitate easy vision, and a Time Valve release can be fitted to the 1932 Soho Reflex Cameras giving exposures from $\frac{1}{4}$ second to 3 seconds.



TIME VALVE DEVICE.

*Fully Illustrated Brochure and Price List from all Dealers or
post free from*

**SOHO LIMITED, PHOTOGRAPHIC
MANUFACTURERS**

Soho Square, London, W.1.

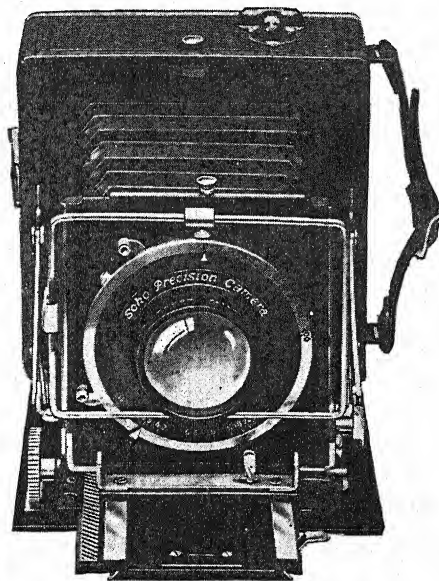
Telegrams Noiram, Rath, London.

Telephone Gerrard 2184 (Two lines)

The Soho "PRECISION"

Triple Extension Camera

Every Essential Movement.



The Soho 'Precision' meets the requirements of the most exacting photographer. Every detail has had careful consideration in manufacture to ensure perfect work.

A specially hardened metal body, to withstand Tropical conditions. A Triple Extension giving $11\frac{1}{4}$ " maximum. Absolutely Rigid Rising Front of 2". Dropping Base-board, allowing Swing Front to be used for Wide Angle work. Revolving Back. Direct Vision Finder.

Size of Picture $3\frac{1}{2} \times 2\frac{1}{2}$ ins., Weight 2 lbs,

Measurements $5 \times 2\frac{1}{2} \times 4\frac{1}{2}$ ins.
Supplied with Three Double Plate
Holder, but without Lens. ...

PRICE COMPLETE

£13. 10. 0.

Ross, Dallmeyer, Cooke or any standard make of Lens can be fitted.

For further particulars apply

SOHO LIMITED, PHOTOGRAPHIC MANUFACTURERS
Soho Square, London, W.1.

Telegrams Noiram. Rath, London.

Telephone Gerrard 2184 (Two lines)

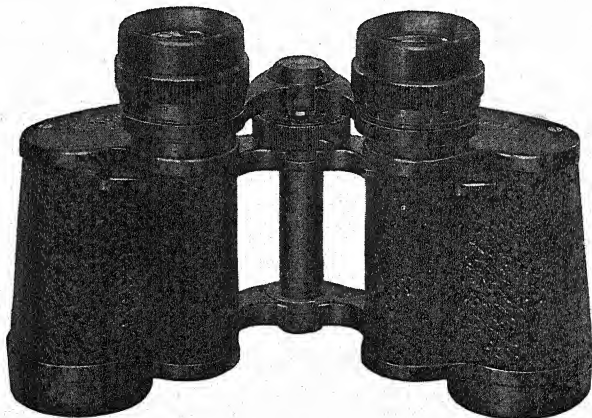
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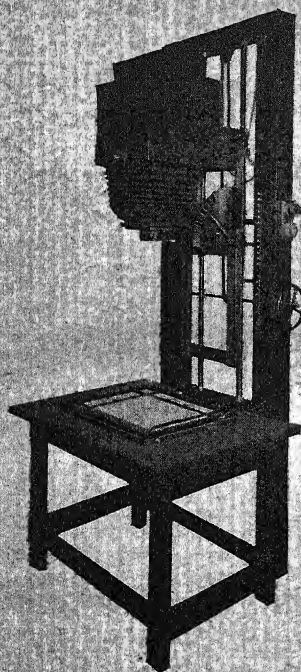
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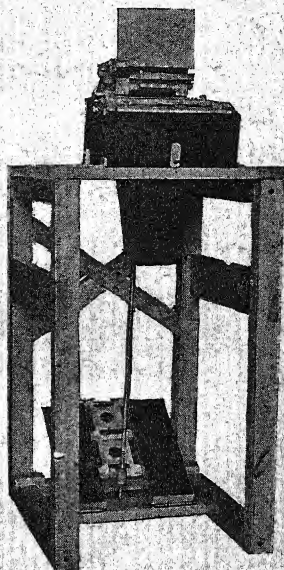
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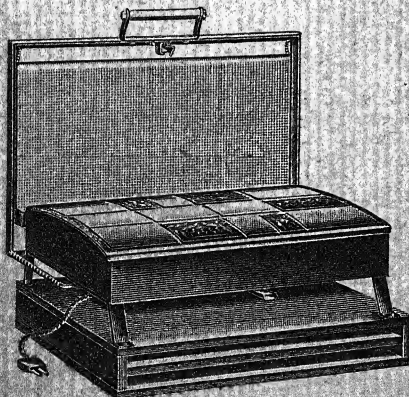
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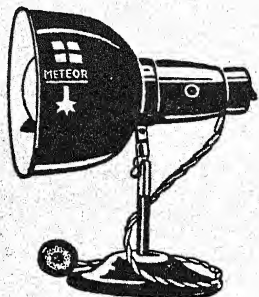
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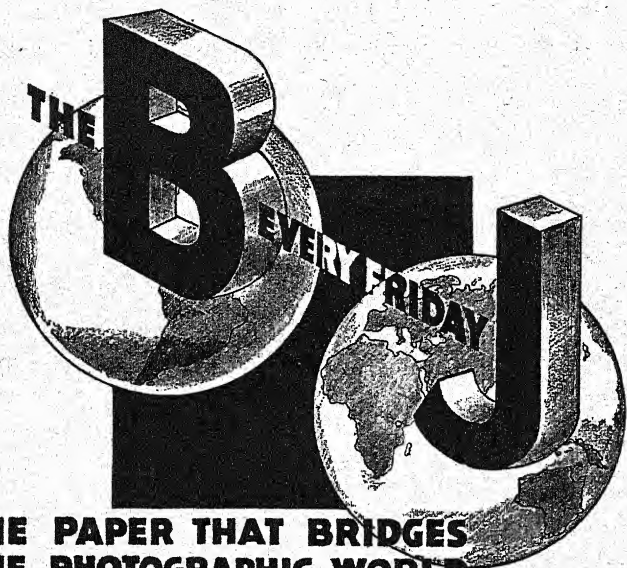


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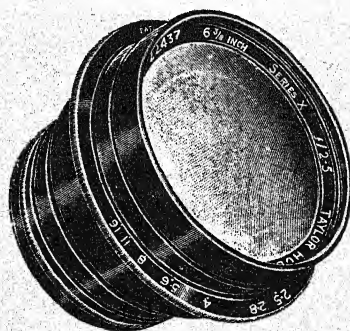
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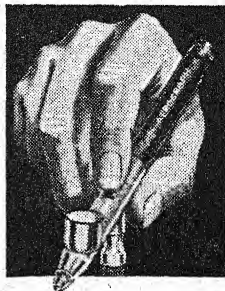
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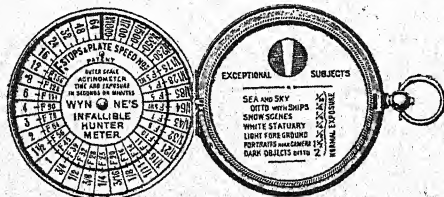
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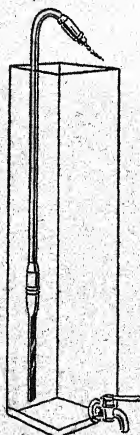
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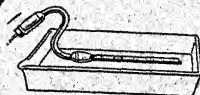
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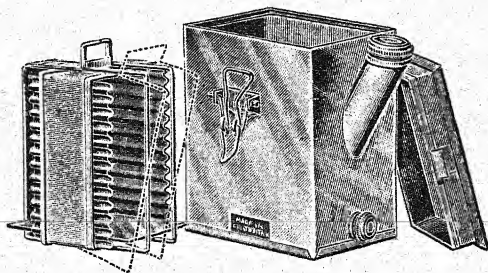
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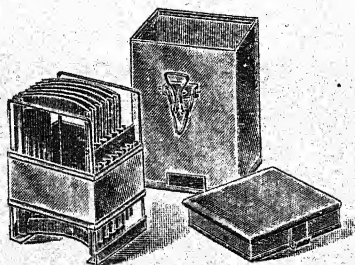
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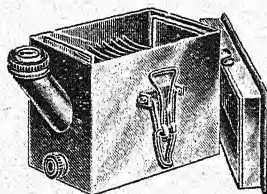
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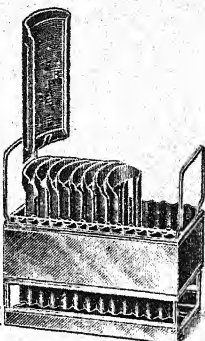
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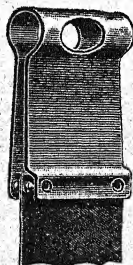
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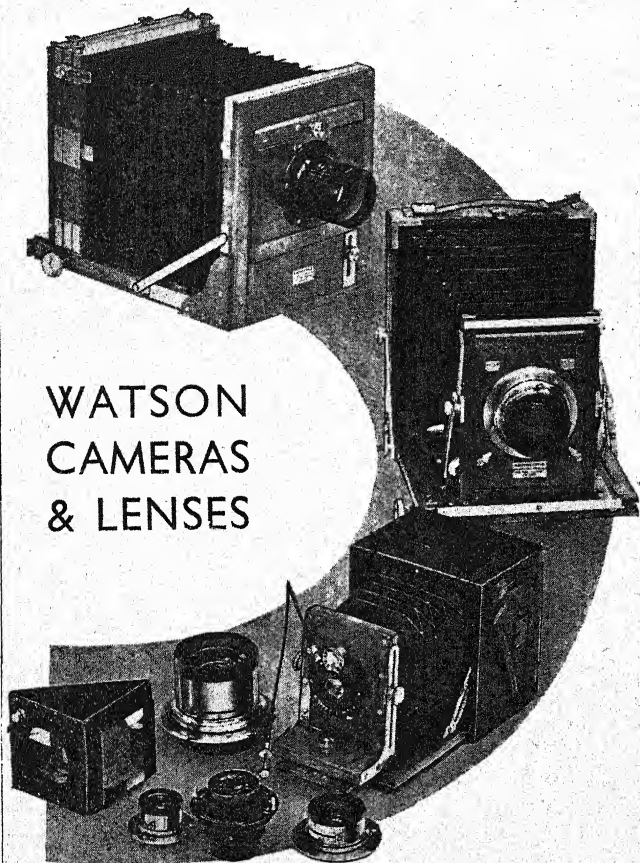
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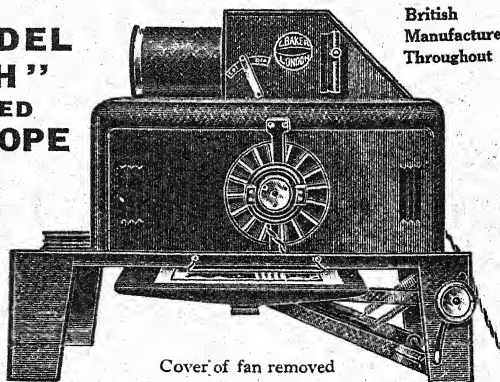
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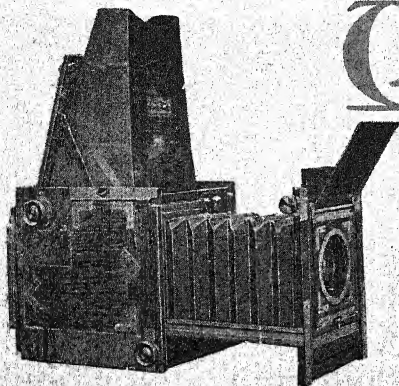
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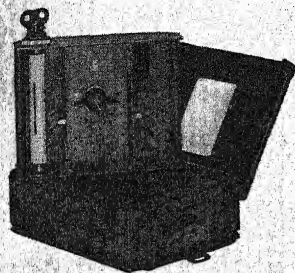
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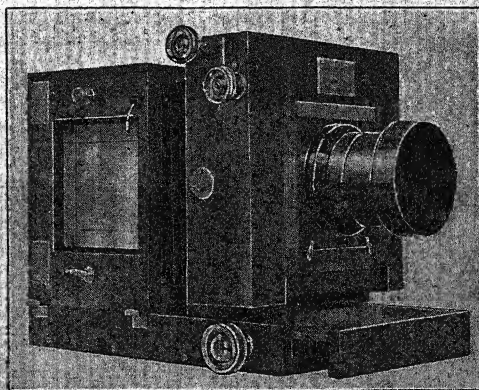
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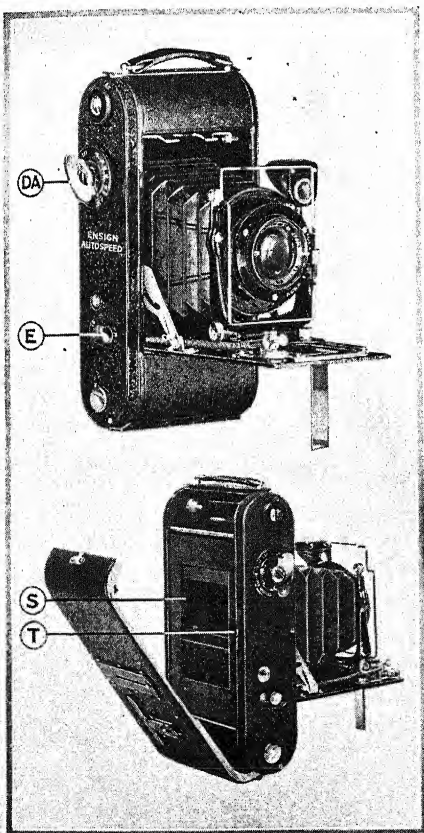
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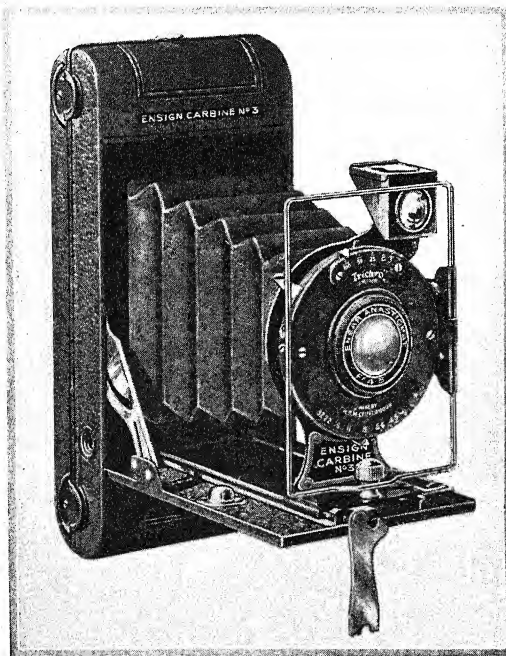
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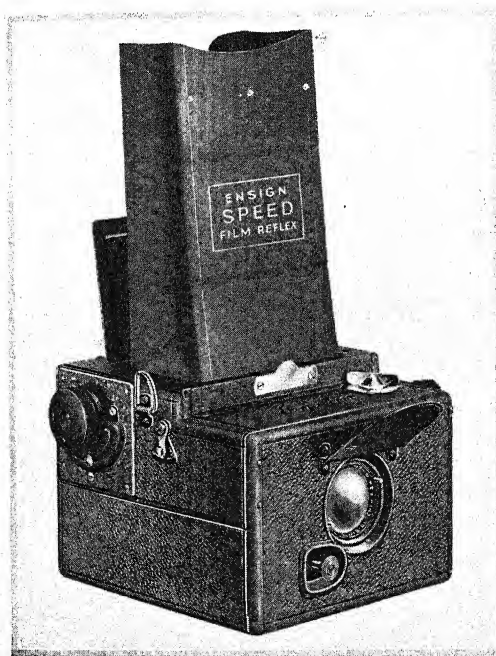
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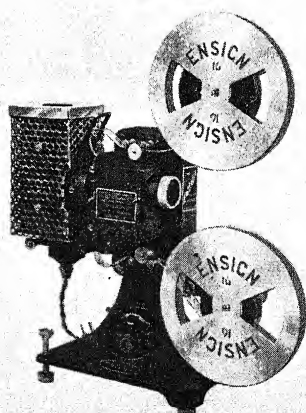
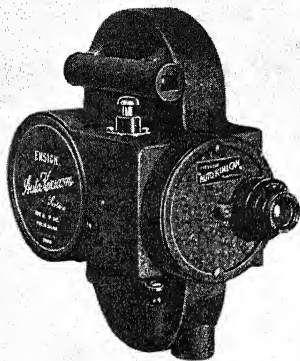
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ENSIGN SILENT SIXTEEN "180" Home-Ciné Projector

Gives a brilliant, flickerless picture. Silent in operation. Can be used at any distance up to 30 ft. from the screen. Simple to operate. It can be worked on any ordinary house lighting supply circuit. A still picture can be shown and the film run backwards if desired. Rewinding by hand or motor.

Complete with 400 ft. spool, lamp, oil bottle, 180-watt lamp, resistance for all voltages 100 to 250, Antique Rexine covered carrying case, and spare driving belt.

£28 : 10 : 0



ENSIGN HOME-CINÉS

BARNET

Plates, Papers and Films

ALL BRITISH MANUFACTURE

Plates

	H. & D.	Speed
SUPER PRESS	1500
PRESS PLATE	700
*SOFT-STUDIO PAN (Panchromatic)		
(2000 H. & D. to Half-Watt)	...	700
*XL-SUPER-SPEED	700
ULTRA RAPID	700
STUDIO	400, 500 and	650
*SUPER-SPEED-ORTHO	550
STUDIO-ORTHO	400
*SPECIAL RAPID PAN (Panchromatic)	...	400
*SELF-SCREEN ORTHO	300
SPECIAL RAPID (Red Label)	275
*ORDINARY. For copying. &c.	100
PAN PROCESS (Rapid Panchromatic)	100
PROCESS. Fine Grain	75
PROCESS ORTHO	50
FINE GRAIN ORDINARY	50
PROCESS (Special Series)	15
LANTERN. Cold Tone
LANTERN. Cold or Warm Tone
C.G. LANTERN. Gaslight for Contact
VERONA LANTERN. Warm Tone
*X-RAY. Extremely Rapid
STELLA PLATE. For Astronomical work

Flat Films

*SUPER-SPEED PORTRAIT FILM	700
SPECIAL RAPID PAN (Panchromatic)	400
*ORDINARY	100
PROCESS	15
ROLL FILMS (Non-Curling)	Self-Screen

*Also made in Matt-Emulsion.

BARNET
MATT-EMULSION PLATES
Non Halation

Prices on Application.

ELLIOTT & SONS, LTD.
BARNET, HERTS, ENGLAND.

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BROMIDE PAPERS

STANDARD GRADES FOR GENERAL USE

ENAMEL

Single and Double Weight	...	Surface.
<i>Extra Vigorous, Vigorous</i>	...	Glossy.
<i>Normal and Soft</i>	...	

MATT

Single Weight	...	Matt.
<i>Vigorous and Normal</i>	...	
Double Weight	...	
<i>Vigorous, Normal and Soft</i>	...	

SEMI-MATT

Single Weight	...	Semi-Matt.
<i>Vigorous and Normal</i>	...	
Double Weight	...	
<i>Vigorous, Normal and Soft</i>	...	

ILLUSTRO (For Press Work)

Single and Double Weight	...	Glossy.
<i>Extra Contrasty, Contrasty,</i>	...	
<i>Normal and Soft</i>	...	

CREAM CRAYON

Double Weight	...	Platino-Matt : Smooth.
<i>Vigorous and Normal</i>	...	Natural Surface : Smooth.
Double Weight	...	Semi-Matt.
<i>Normal</i>	...	Platino-Matt : Rough.
	...	Natural Surface : Rough.

PLATINO-MATT

Single and Double Weight	...	Rough.
<i>Normal</i>	...	
Single and Double Weight	...	Smooth.
<i>Normal and Vigorous</i>	...	

ORDINARY

Single and Double Weight	...	Rough and Smooth.
<i>Normal</i>	...	
Single and Double Weight	...	Smooth.
<i>Vigorous</i>	...	

TIGER TONGUE

Double Weight, <i>Normal</i>	...	White and Cream.
	...	Extra Rough.

Prices on Application.

ELLIOTT & SONS LTD., BARNET, ENGLAND.

BARNET
PLATES, PAPERS & FILMS



BARNET

Plates, Papers and Films

ALL BRITISH MANUFACTURE

BROMIDE PAPERS

(Continued).

MEDIUM ROUGH

Double Weight	} Cream and White.
Vigorous and Normal	

Surface.

VELBRO

Single Weight Normal ... Velvet (Pebble Grain).

LINEN GRAIN

Double Weight Normal ... White and Cream.

POST CARDS in all Grades.

Verona

(BARNET CHLORO-BROMIDE)

For Mezzo-Brown tones by development only.

Verona is made in two series—"Standard" for Contact Prints; "Rapid" for Enlargements.

VERONA "STANDARD"

Cream Smooth Natural ...	...	Double Weight.
Cream Rough Natural ...	...	Double Weight.
Cream Matt ...	...	Double Weight.
Cream Semi-Matt... ..	Single and	Double Weight.
White Matt ...	...	Double Weight.
White Semi-Matt ...	Single and	Double Weight.
White Silk-Lustre... ..	...	Double Weight.
Cream Silk-Lustre ...	...	Double Weight.

VERONA "RAPID"

Cream Smooth Natural ...	...	Double Weight.
Cream Rough Natural ...	...	Double Weight.
Cream Smooth Matt ...	...	Double Weight.
White Matt ...	...	Double Weight.

VERONA "PLATINO-SPECIAL"

Creamy White ... Double Weight.

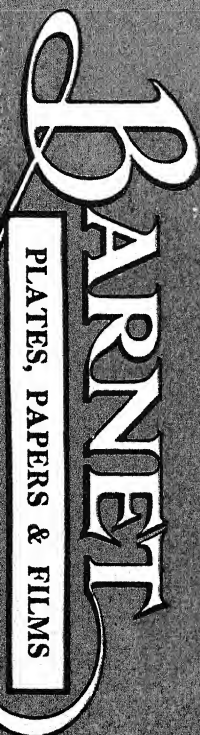
For Contact Prints and Enlargements.

Prices on Application.

ELLIOTT & SONS LTD., BARNET, ENGLAND.

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BARNET

Plates, Papers and Films

ALL BRITISH MANUFACTURE

Bar-Gas

BARNET GASLIGHT PAPER

MEDIUM	...	For Average Negatives	} In Art, Glossy and Matt.
VIGOROUS	...	For Thin Negatives	
SOFT	...	For Hard Negatives	
Single Weight and Card all Surfaces.			

A Gaslight Paper of great charm, clean working and reliable. Made in three grades to suit negatives of any character, whether thin or hard in quality.

An ideal paper for Snapshot prints and highly recommended for

D. & P. WORK.

Bromoil

Specially made for the Bromoil Process.

CREAM CRAYON	... ..	Natural Surface. Rough and Smooth.
ORDINARY WHITE	... ..	Rough and Smooth.
TIGER TONGUE	... ..	Cream and White. Extra Rough.

Trade Printing

Enlargements and Contact Prints made from Photographers' own Negatives.

**PORTRAITURE. ARTISTIC FINISHING.
COMMERCIAL ADVERTISING.
PICTORIAL.**

Prices on Application.

**ELLIOTT & SONS, LTD.
BARNET, HERTS, ENGLAND.**

Telephone: Barnet 0011. Telegrams: "Elliott, Barnet."
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This portrait study is by courtesy of Daisy E. Edis, Durham. On the right: "Water Lilies after rain," by Harold Hood, F.R.P.S. Below: Christening Cake, by courtesy of Messrs. J. Meredith & Son, M'bro.

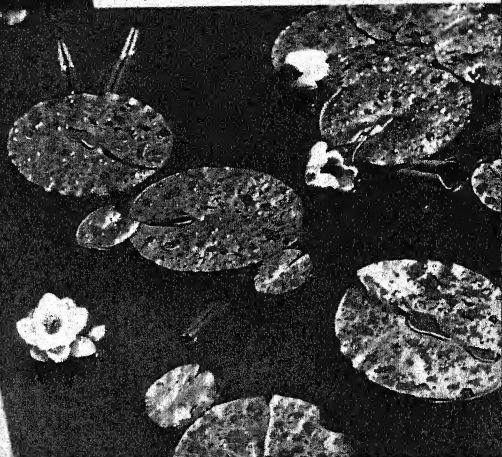
HOOD

& CO. LTD.

**ENGRAVERS
PRINTERS
PHOTOGRAVURERS
AND SPECIALISTS IN
ILLUSTRATION**

HOODS

printed this inset in
PHOTOGRAVURE
Whenever you desire
Reproductions of
Photographs by any
Illustration Process
THINK OF HOODS



HOODS were established 68 years ago (in the days of Abraham Lincoln!), they have always specialized in first class printing and illustrating, and are now producing some of the finest possible tone block and gravure work. More and more pictures are used everywhere and will be used increasingly for many new purposes. Do not hesitate to consult HOODS

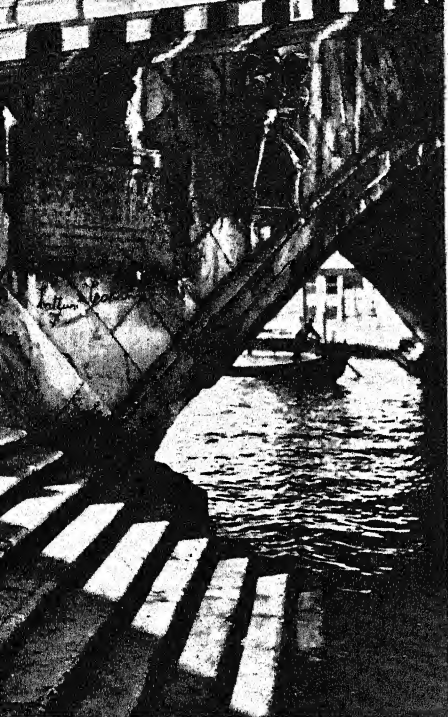
**SANBRIDE PRESS
MIDDLESBROUGH**

ENGRAVING

HOOD Standard Tone Blocks carefully fine-etched to bring out every shade and detail of the original photograph; produced rapidly, and in addition carry the considerable advantages of the Hood patent Bevel. Hoods offer exceptionally generous trade terms (to photographers, printers and publishers only).

All the usual retouching, lettering or typesetting is carried out, at very low prices for very excellent work.

Please notice that our finest grade are now called "Standard" quality blocks. Our cheap Autoblocks are *not suitable for urgent work*, owing to the mass system under which these exceptionally low-priced blocks are produced. Send for attractive folder which shows just exactly the different specifications of "Standard" and "Autoblocks." Send also for any of the following: Block Price List, specimen proofs, and Screen Chart, all gratis and post free on request.



Rialto Bridge, Venice. Right: Milan Cathedral.
Photos. by Harold Hood, F.R.P.S.

HOODS produce all
BLOCKS including:

OUR BLOCKS

1, 3 or 4 colour, from Coloured
Objects, Pictures, Autochromes, or
from uncoloured Photographs.

THE BLOCKS

The best that money can buy.

THE BLOCKS

Cheap commercial competitive
blocks for competitive trades.

THE BLOCKS

Very rapid, reliable despatch.

THE BLOCKS

Deeply electric-etched, will print
on almost any kind of paper.

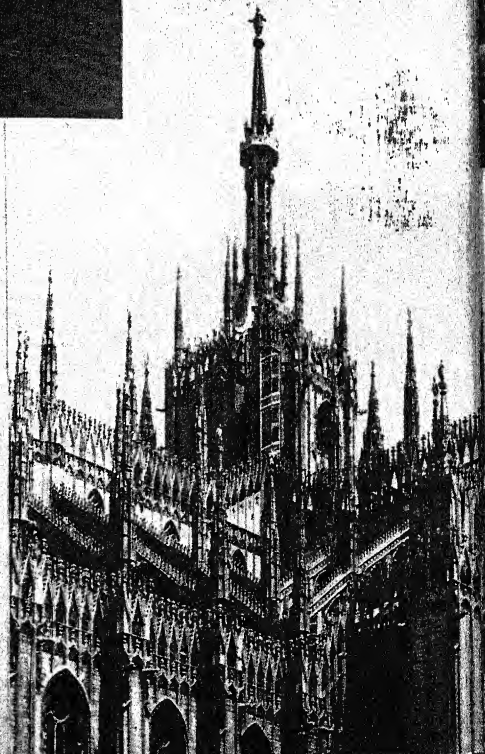
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Reproducing line drawings.

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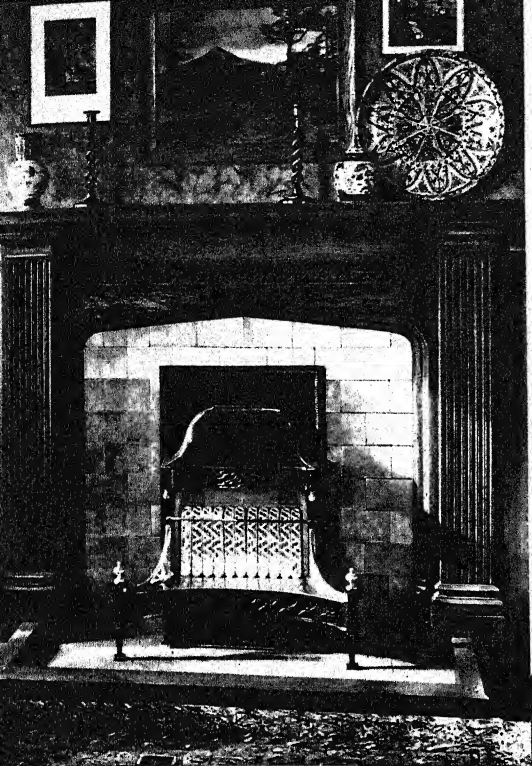
FOR & DOOR PLATES

HOODS Engravers
BRIDGE
WORKS, Middlesbrough



PRINTING

In addition to photogravure and the engraving of blocks, Hoods produce excellent General Printing, especially illustrations for commercial, scientific, or advertising purposes. As the "British Printer" says, "Messrs. Hood do know how to print illustrations." Hoods plan and make Catalogues for all trades. Effective and striking *Booklets* for selling any goods, dignified brochures for hospital or church appeals. Attractive and most beautifully printed *Booklets* or *Wallets* containing *Tone - Block - Prints* for the advertising of Colleges and Schools. We especially welcome Export enquiries; owing to the present rates of exchange we are enabled to quote **EXTREMELY FAVOURABLE PRICES** for all kinds of printed or illustrated matter.



GRAVURE

Gives the following advantages: Wonderfully good reproduction of photographs, preserving especially good detail in the middle tones and giving great richness of effect—in many cases more pleasing than actual photographs. Both the finest and the cheapest papers are used for gravure, which stands handling and other detrimental conditions better than halftone impressions. Gravure scores heavily where very large editions can be issued.

Use Hood Gravure for things like booklets, folders, broadsides, catalogues, book inserts or illustrations. The process can be adapted to suit any requirements between inexpensive, large-quantity work and extremely exacting reproductions de luxe.

No price list can be issued for gravure work, as each job is essentially different, but we shall be pleased to send you specimens of Hood gravure and to prepare special patterns or designs complete with estimates, on receiving particulars.





12,000 POSTCARDS

Send for particulars of our Postcard services. Please ask for Photogravure postcard list or Tone Block postcard list or both. A large batch of sample postcards, Sixpence please! A few specimens free.

Photogravure Postcards cost from 8s. 3d. up to 58s. 4d. per thousand, depending on number of subjects and number of cards from each subject. A large range of colours are available, for dead-matt or semi-glossy finishes.

Any desired effect can generally be matched, whether rich toned or delicate.

Our capacity is 250,000 gravure cards per day; and twice this number of tone block cards per day.

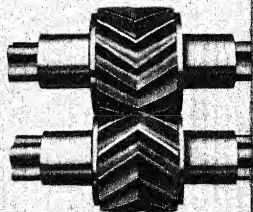
An example of our Tone Block Postcard prices: A standard marginal block costs 14s. 5d. and each 1000 postcards from it cost only 18s. 6d. (and much less than this for large quantities).

Note the improved delivery arrangements on Hood's Tone-Block Postcards. We never despatch normal cards even a day later than the 21 days. (Sometimes less!). HOOD 1-DAY cards are, as before, despatched per passenger train or post, and in the standard process *within 8 working hours* of receipt by us of your original photo or negative. This is under a *guaranteed* despatch system which we have had working now for many years.

HOODS SANBRIDE PRESS MIDDLESBROUGH



—A GOOD EXAMPLE OF AN ENTIRELY UNRETOUCHED PHOTO FOR REPRODUCTION by BLOCK, OR (AS HERE) BY PHOTOGRAVURE. ANOTHER VERY MUCH RETOUCHED. LET HOODS QUOTE FOR THIS RETOUCHING



The Adhesive Dry Mounting Co., Ltd.

THE

Adhesive Dry Mounting Co.

LIMITED

THE

Pioneers of Dry Mounting.

Important Notice.

When ordering Tissue, see that you
Specify for

“ADEMCO TISSUE”

THE ORIGINAL AND BEST

Every sheet bears the Watermark
“ADEMCO,” also the packet should
bear our own label.

Ask for

“ADEMCO”

TISSUE.

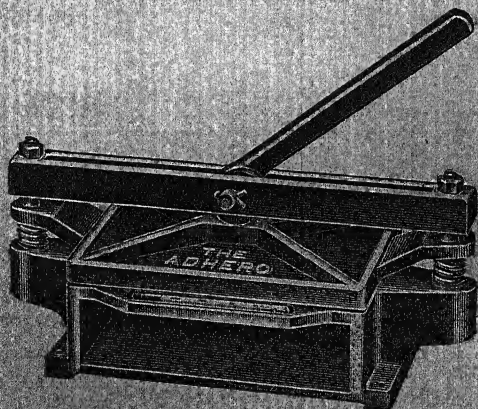
27 & 28, Fetter Lane, London, E.C.4.

The Adhesive Dry Mounting Co., Ltd.

Telegrams—"Accroitre, London," Code A.B.C.

The ADHESIVE DRY MOUNTING CO., Ltd.,
27 & 28, Fetter Lane, London, E.C.4.

ORIGINATORS OF THE DRY MOUNTING PROCESS



"THE ADHERO"

The only machine for amateurs at the price giving even pressure over the whole of the surface of the print at one and the same time.

Those acquainted with the extreme value which may be attached to the Dry Mounting method candidly admit that this apparatus brings the amateur in line with the professional as regards mounting.

The Dry Mounting method is most simple and effective.

The "ADHERO" machine will mount a 1-plate, 5 by 4, or a 2-plate print on a mount up to 10 inches wide in one pressure. Whole plate prints on 10 by 15 mounts in two pressures. Size of heated plate 7½ by 5½, width between arms 10½ inches.

PRICES.

OUTFIT No. 1.	for Gas heating.	55s. 0d. complete	
" "	" 2. " Spirit "	60s. 0d.	"
" "	" 3. " Electricity.	75s. 0d.	"

Each Outfit includes all Accessories and One Packet of Adhesive Tissue. Border Tints. and Mounts.

27 & 28, Fetter Lane, London, E.C.4.

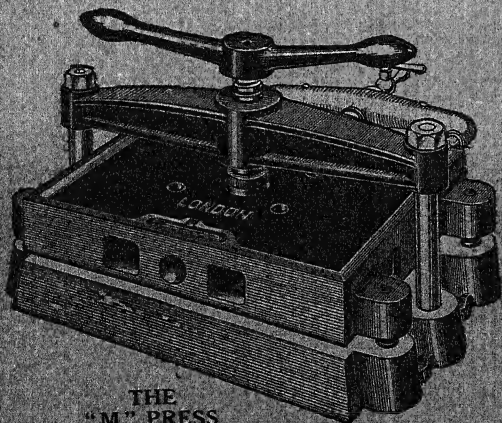
The Adhesive Dry Mounting Co., Ltd.

DRY MOUNTING MACHINE

THE "M" PRESS

A Dry Mounter for Amateurs and Professionals

This machine is suitable for amateur and professional photographers who go in for larger work than half-plate. It is the best value at the price.



THE
"M" PRESS

PRICE.

	Nett.
	£ s. d.
Heated by Gas	6 10 0
Heated by Electricity	10 10 0

Size of Heated Plate, 12 by 8 in. Width between the Arms, 13½ in.
Will mount prints up to 12 by 8 in. on a mount 13½ by 10 in. in one pressure
or a 12 by 15 print on a mount 13½ by 18 in. in two pressures.

ACCESSORIES FOR "M" MACHINE.

	each	s. d.
Mounting Covers, size 12½ by 9½ in.		3 6
No. 1, Glazed Surface, Zinc		3 6
No. 2, Matt		2 6
Fixing Iron in Wood Handle		4 0
Spirit Lamp for Heating Fixing Iron		7 6
Gas Burner for ditto		3 6
Extra Thermometer for Gas Machines		3 0
" Electric Machines		

Write for illustrated Catalogue post free.
For prices of Adhesive Tissue see page 87.

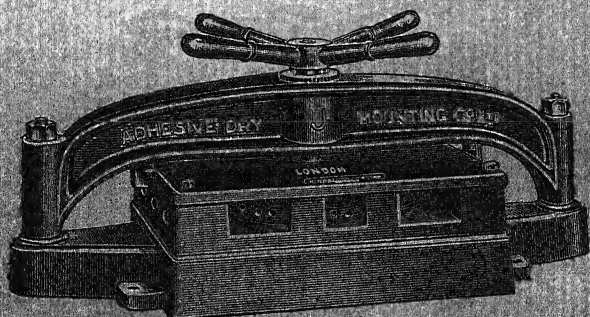
27 & 28, Fetter Lane, London, E.C.4.

The Adhesive Dry Mounting Co., Ltd.

The IMPROVED MODEL DRY MOUNTER

"J" PRESS

Designed to meet the requirements of every Professional Photographer.



This new model Dry Mounter has a platen of 15½ in. by 12½ in. width between the arms 24½ in. allowing of a mount to be inserted 24½ in. full: a most convenient size for mounting 15 in. by 12 in. prints. Can be heated by gas or electricity. When ordering for electricity please state voltage.

PRICES.

Nett.

Heated by Gas	£	s.	d.
.. .. Electricity	11	10	0
	16	0	0

TYPE "U" PRESS exactly similar in working, constructed with a larger platen for mounting up to 20 in. by 16 in. prints.

Size of Heated Plate, 20 in. by 16 in.	Heated by Gas	£	s.	d.
Width between Arms, 21 in.	.. .. Electricity	20	0	0
		28	0	0

Write for Illustrated Catalogue, containing prices of Accessories for "J" and "U" Presses post free.

For prices of Ademco Tissue see page 87.

27 & 28, Fetter Lane, London, E.C.4.

The Adhesive Dry Mounting Co., Ltd.

"ADEMCO" ADHESIVE DRY MOUNTING TISSUE

THE ORIGINAL
AND THE BEST

EFFICIENCY AND HIGH GRADE
OF MANUFACTURE GUARANTEED.

Absolutely Reliable. Perfect Adhesion
and permanency after the lapse of any
length of time.

Used by the leading photographers the
world over.

FOR TROPICAL COUNTRIES.

We supply Tissue interleaved with
special material for Tropical Countries;
this greatly reduces the risk of damage
during transit.



See that every sheet bears
this Trade Mark.

PRICES

Size		9d. Pkts.	1s. 3d. Pkts.	One Gross Boxes.	
				s.	d.
31 by 21	...	30 pieces	...	1	6
39 " 31	...	60	...	1	9
42 " 31	...	54	...	2	0
5 " 4	...	40	...	2	8
5 1/2 " 5 1/2	...	36	...	3	0
6 " 4 1/2	...	...	48 pieces	3	0
4 1/2 " 4 1/2	...	...	48	3	0
6 1/2 " 3 1/2	...	...	48	3	3
6 " 4 1/2	...	...	44	3	10
6 1/2 " 4 1/2	...	...	40	6	0
8 " 6	...	...	...	7	2
8 1/2 " 6 1/2	...	...	22	...	...
10 " 8	...	...	2s. Pkts.	9	9
12 " 10	...	...	25 pieces	14	3
15 " 12	...	...	18	21	9
20 " 16	...	...	12	37	9
20 " 24	...	...	...	54	0
20 " 24	...	...	per quire	9	0
20 " 24	...	...	per 5-quire	4	9
20 " 24	...	...	per roll	9	0

Rolls, 30 ft. by 30 inches

Sample Packet post free on application.

27 & 28, Fetter Lane, London, E.C.4.

The Adhesive Dry Mounting Co., Ltd.

The "ADEMCO" ELECTRIC MOUNTING IRON

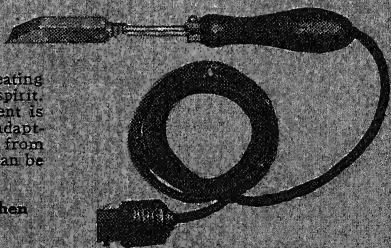


PRICE, complete with Thermometer, Fixing Iron, Metal Plate, Mounting Tissue, Mounts and Tints, packed in a convenient wooden box, together with 5 feet of flex.

WHEN ORDERING PLEASE STATE VOLTAGE.
COMPLETE 35/-.

ELECTRIC DRY MOUNTING FIXING IRON

Every Photographer using an Electric Dry Mounter will find this iron a great advantage over the old method of heating the fixing iron by gas or spirit. The consumption of current is exceedingly small, and is adapted for use on any voltage from 200-250. Other voltages can be adapted to order.



Please state voltage when ordering.

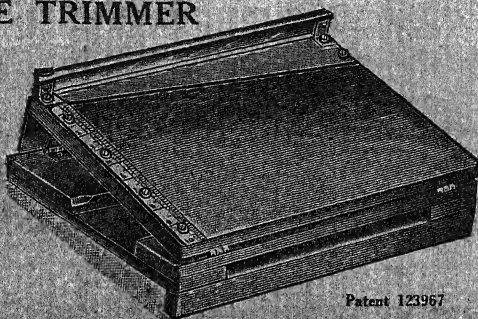
Price complete with 5 feet of flex, 12/6 nett.

27 & 28, Fetter Lane, London, E.C.4.

The Adhesive Dry Mounting Co., Ltd.

MERRETT'S PATENT AUTOMATIC VISIBLE TRIMMER

The most efficient and practical Print Trimmer on the Market. Will trim prints equally well wet or dry.



Patent 123967

		S. d.			S. d.
8½ in. cut (21 cm.)	...	12 6	15½ in. cut (41 cm.)	...	55 0
10 " " (25 cm.)	...	25 0	24 " " (60 cm.)	...	90 0
12½ " " (31 cm.)	...	35 0	Larger sizes up to 42 in.		

THE NEW MERRETT MARGIN TRIMMER



The trimmer is constructed to serve a double purpose. It can be used as an ordinary print trimmer, also converted into a Margin Trimmer, to trim margins from ½ to 8 of an inch.

Price
25/-
nett

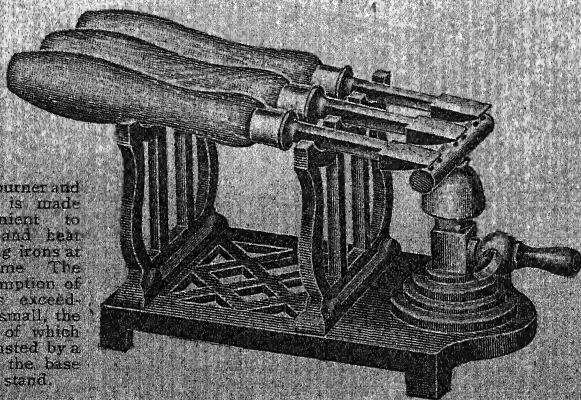
Made to cut up to 8½ in., larger sizes made to order.

Sole Agents for Merrett's Trimmer, Margin Trimmers & Trimmerettes.

27 & 28, Fetter Lane, London, E.C.4.

The Adhesive Dry Mounting Co., Ltd.

NEW TRIPLE GAS BURNER AND HOLDER FOR FIXING IRONS



This burner and stand is made convenient to hold and heat 3 fixing irons at one time. The consumption of gas is exceedingly small, the flame of which is adjusted by a tap at the base of gas stand.

Price 10/6

Irons extra, 2/6 each.

"ADHERO" CAMBRIC AND MATT BORDER TINTS.

These papers are coated on the back with our Dry Adhesive, so that it is only necessary to trim to the desired dimensions. They make a very unique and effective finish to any mount.

Sample free on application.

FLEXIBLE MOUNTS

ADHERO SERIES.

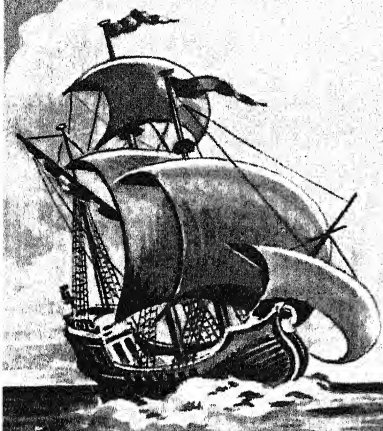
ANTIQUARIAN SERIES.

Specially adapted for Dry Mounting.

Sample Book free on application.

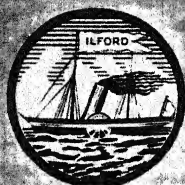
Customers' own prints mounted in our own showroom at reasonable prices, or special quotations given for quantities.

27 & 28, Fetter Lane, London, E.C.4.

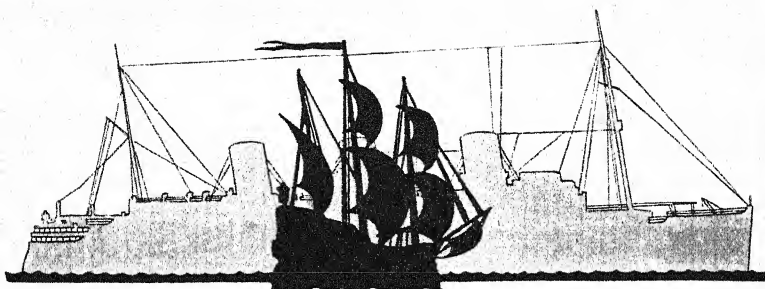


PROGRESS ILFORD

LIMITED
ILFORD ..
LONDON



REG. TRADE MARK



PROGRESS

In this age of progress Ilford Limited maintain their high position in the photographic world, improving the already superb quality of their materials and introducing new products for the benefit of all who use Photography for either pleasure or profit.

Recent introductions include Hypersensitive Panchromatic Plates and Films—the fastest Plates and Films yet made, Double-X-Press Plates and Infra-Red Plates.

For scientific work involving the use of Infra-Red Rays—aeronautical, astronomical and long distance photography, photomicrography, etc., the Infra-Red Plate will prove invaluable. Some comparative photomicrographs are reproduced on the opposite page.

Ilford Limited will continue to progress and justify the highest esteem of photographers all over the world.

ILFORD

PLATES • PAPERS • FILMS

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ILFORD LIMITED, ILFORD, LONDON



Whirligig Beetle



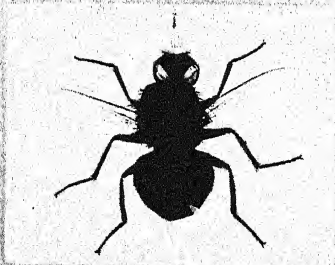
Whirligig Beetle



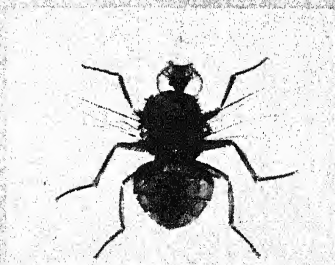
Head of Whirligig Beetle



Head of Whirligig Beetle



Blow Fly



Blow Fly

Photomicrographs on Ilford Panchromatic Plate and Red Filter
and Ilford Infra-Red Plate and Filter.

The right hand reproductions are on Ilford Infra-Red Plate.

Ilford Infra-Red Plate is not available for Tropical markets.

REGISTERED
TRADE MARK



ILFORD PLATES

for

Studio & Commercial Photography

The wonderful reputation of Ilford Plates has been built up by vigorous maintenance of the highest possible standard of quality. For this reason they have been the standby of professional users for over half a century. The series of Plates for Studio and Commercial Photography comprises a grade for every requirement of the Professional Photographer, each plate worthily upholding the Ilford standard.

Details of Ilford Panchromatic Plates will be found on page 96.

The following is a selection of plates for Studio and Commercial Photography :—

Golden Iso-Zenith	...	...	Speed	1400 H & D
Iso-Zenith	...	...	"	700 H & D
Zenith	...	...	"	650 H & D
Iso-Record	...	...	"	500 H & D
Record	...	...	"	500 H & D

REGISTERED
TRADE MARK



ILFORD LIMITED, ILFORD, LONDON



PHOTOGRAPH BY JULIA WARREN, BRIGHTON
NEGATIVE ON ILFORD ISO-ZENITH PLATE

REGISTERED
TRADE MARK



ILFORD LIMITED, ILFORD, LONDON

ILFORD

PANCHROMATIC PLATES

A new plate, the Hypersensitive Panchromatic, has recently been added to the Ilford series of Panchromatic Plates. This is the fastest plate yet made, having a speed of 2500 H & D to daylight and 8000 H & D to Half-Watt lighting. This plate will prove invaluable for all kinds of work by artificial lighting.

The Soft Gradation Panchromatic Plate is used by many of the world's best Portrait Photographers because of its excellent performance under Half-Watt lighting. It combines high speed with soft gradation and full colour sensitiveness.

The following are the grades of Ilford Panchromatic Plates :—

* Hypersensitive Panchromatic	Speed 2500 H & D to daylight 8000 H & D to Half-Watt light
Soft Gradation Panchromatic	„ 700 H & D to daylight 2000 H & D to Half-Watt light
Special Rapid Panchromatic	„ 400 H & D
Rapid Process Panchromatic	„ 100 H & D

* The Hypersensitive Panchromatic Plate is not at present available for tropical markets.

REGISTERED
TRADE MARK



ILFORD LIMITED, ILFORD, LONDON



St. Paul's Cathedral

PHOTOGRAPH BY H. BEDFORD LEMERE, F.R.P.S.

NEGATIVE on ILFORD SOFT GRADATION PANCHROMATIC PLATE

REGISTERED
TRADE MARK

ILFORD LIMITED, ILFORD, LONDON



ILFORD

FLAT FILMS

for

Studio & Commercial Photography

An extensive series of Ilford Flat Films is available for those photographers who prefer films to glass plates. They are of exceedingly high quality and are anti-halation backed, thus ensuring protection against light spread and greatly widening the scope of their application.

It will be noted from the list below that there are two grades of Portrait Film—Ortho Fast (Speed 700 H & D), and Medium (Speed 350 H & D), which, with the Hypersensitive Panchromatic Film, provide for all the requirements of the Portrait Photographer.

Portrait Film, Ortho Fast ...	Speed	700 H & D
" " Medium ...	"	350 H & D
* Hypersensitive Panchromatic	"	2000 H & D to daylight 5000 H & D to Half-Watt light
Panchromatic... ..	"	400 H & D
Commercial Ortho	"	250 H & D

* The Hypersensitive Panchromatic Film is not at present available for tropical markets.

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ILFORD LIMITED, ILFORD, LONDON



PHOTOGRAPH BY JACK THOMAS, SWANSEA
NEGATIVE on ILFORD HYPERSENSITIVE PANCHROMATIC PLATE
Exposed by the light of two matches burnt simultaneously

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ILFORD LIMITED, ILFORD, LONDON



ILFORD

DOUBLE - X - PRESS & PRESS ORTHO PLATES

Press Photographers will welcome the addition of two new Press Plates to the Ilford series. These new plates have been specially manufactured for Press Photography and combine all the essential qualities for press work : high speed, great latitude, quickness in fixing, cleanliness in working and fineness of grain.

For all ordinary press subjects the speed of the Press Ortho Plate, combined with its orthochromatic qualities, is sufficient to allow of the minimum exposure being given with absolute safety, while for fast work in poor light the speed of the Double-X-Press Plate, which is also highly orthochromatic, ensures successful results.

These plates can be developed out without the slightest fear of graininess, and fix with extreme rapidity. They are a revelation in high speed and quickly will become the standby of the Press Photographer.

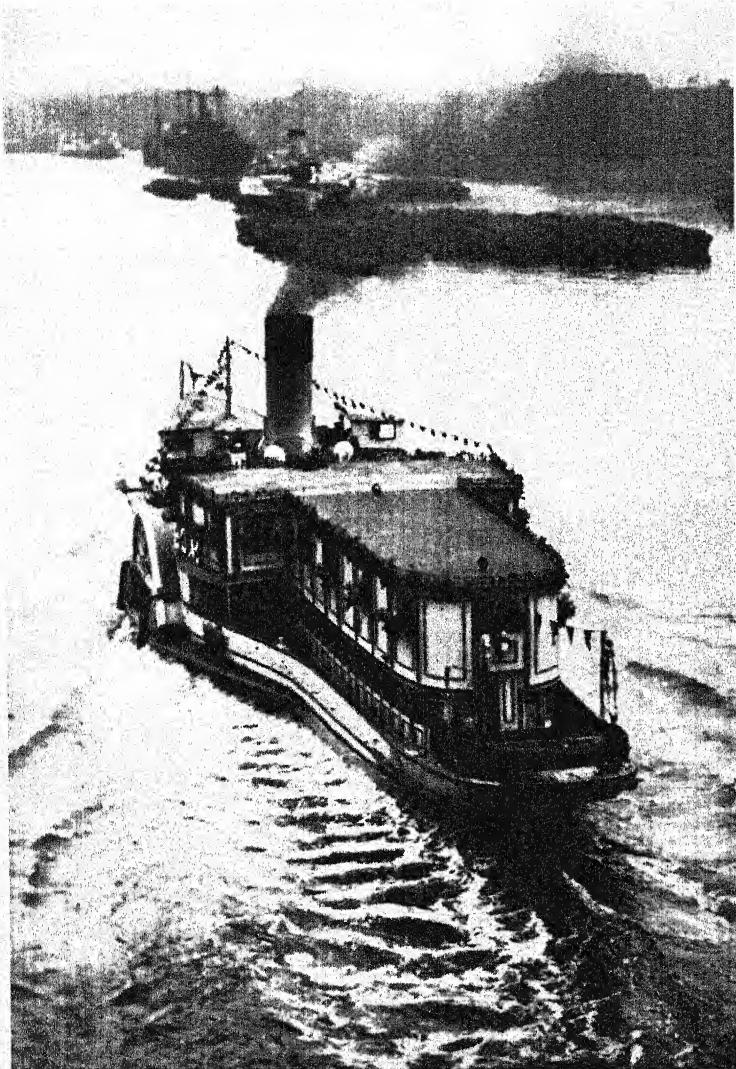
These Plates are of two speeds :—

Double-X-Press	...	...	...	1500 H & D
Press Ortho	...	...	...	700 H & D

REGISTERED
TRADE MARK



ILFORD LIMITED, ILFORD, LONDON



PHOTOGRAPH BY FOX PHOTOS

NEGATIVE on ILFORD DOUBLE-X-PRESS PLATE

Exposed at 9 o'clock on a very dull evening in July,
the exposure being 1/50th second at F/4.5

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ILFORD

PROCESS PLATES & FILMS

Ilford Limited have specialised for many years in the manufacture of Plates, Papers and Films for Process work, and have available a series of goods which covers every phase of Photo-mechanical work.

Ilford Process Plates and Films are noted for their cleanliness in working, great contrast and density, and for their unfailing characteristic of giving sharp lines and clean dots.

Recently a new grade has been added to the Process series—Ilford Thin Base Process Film. This film is coated with the same emulsion as the Process Film, but is on a much thinner base. Ilford Thin Base Process Film will prove extremely helpful in the preparation of composite negatives.

Full details of all Ilford Plates and Films for Process Work will gladly be forwarded on application.

REGISTERED
TRADE MARK



ILFORD LIMITED, ILFORD, LONDON

ILFORD

PHOTOMECHANICAL PAPER

Ilford Photomechanical Paper, as its name implies, is specially manufactured for photo-mechanical work. It is used extensively for line blocks, coarse half-tones and photo-lithography, and has been found to be of the utmost value by reason of its extremely fine process emulsion and translucent base.

The emulsion, which is similar to that used for Ilford Process Plates and Films, gives extreme density and perfectly clean whites. It is free from any tendency to fog.

Ilford Photomechanical Paper is made in two grades, Ortho and Non-Ortho, and thereby provides for every type of copy.

ILFORD

STRIPPING PAPER (Strip Film)

This paper is specially manufactured for photo-mechanical work, and will be found of great assistance to the process engraver.

The stripped film is sufficiently thick to handle without difficulty, and can be cut to any desired size or shape.

The film is anti-halo backed and yields beautiful crisp results.

REGISTERED
TRADE MARK



ILFORD

PLATES

For Amateur Photography

Amateur photographers all over the world rely on Ilford Plates. They know that the same high standard of quality which characterises Ilford products made for professional use is also to be found in materials made specially for amateur photography.

Special Rapid Panchromatic and Auto Filter Plates are the generally accepted plates for amateur photography, and their use will guarantee successful results.

The following is a selection of Ilford Plates made specially for the amateur :—

Iso-Zenith	...	...	...	Speed	700 H & D
Auto-Filter	...	...	...	"	400 H & D
Rapid Chromatic	...	...	...	"	400 H & D
Special Rapid Panchromatic				"	400 H & D
Screened Chromatic	...	...	...	"	270 H & D
Special Rapid	...	...	...	"	270 H & D

REGISTERED
TRADE MARK



ILFORD LIMITED, ILFORD, LONDON

ILFORD

NEGATIVE CARDS

Iford Negative Cards are supplied in two grades—Studio Negative Card and Outdoor Negative Card, and are recommended for use where speed of operation and cheapness are essential considerations.

The base and emulsion are specially prepared so that development, fixing and washing are completed quickly.

Iford Negative Cards can be retouched with the greatest ease, the surface responding to pencil, knife or brush.

Card negatives are easily stored and can be marked on the back with all necessary particulars ; as positives are made by reflection only one surface of the card needs protection.

Studio Negative Card ... Speed 1000 H & D
For use in studios, by day or artificial light

Outdoor Negative Card ... Speed 250 H & D
For beach or outdoor photography.

REGISTERED
TRADE MARK



ILFORD

BROMIDE PAPER

Ilford Bromide Paper provides for every requirement of the photographer, whether for professional, commercial, scientific or amateur purposes.

The professional photographer has a wide selection of artistic surfaces to satisfy the most discriminating of his clientele. For scientific and commercial photography entailing much reproduction work there are Glossy, Press Glossy, and Semi-Matt Grades available, all of which are supreme in their particular classes. For exhibition work there is an unexcelled variety of grades, all of which will greatly increase the exhibitor's chances of success.

Ilford Bromide Paper is of unvarying consistency and unparalleled latitude ; it has a wonderfully long scale of gradation and gives rich sepia tones by sulphide and hypo alum toning processes.

Full details of all grades will be found in the Ilford Bromide Price List sent post free on application.

REGISTERED
TRADE MARK



ILFORD LIMITED, ILFORD, LONDON

ILFORD

CLORONA PAPER

Clorona—the Ilford warm tone developing paper—gives prints of superior colour, a rich warm black, by development only.

The normal colour of a Clorona print closely resembles that of an old mezzotint engraving—rich, mellow, full of beauty—but Clorona is an adaptable paper, and by modification of exposure and development, a variety of colours from sepia to bright red is obtained.

Clorona is made in white and cream and in an assortment of surfaces, which for texture and beauty of finish cannot be surpassed.

Clorona has an exceptionally long scale of gradation and renders perfectly the delicate tones in a good portrait negative. A properly made Clorona print is a delight to the eye and is characterised by rich, luminous shadows, beautifully graded half-tones, sparkling high-lights, and an incomparable image colour.

Full details of all grades will be found in the Ilford Clorona Price List sent post free on application.

REGISTERED
TRADE MARK

ILFORD LIMITED, ILFORD, LONDON



SELO

ROLL FILM

Selo is the British Made Roll Film which has won the confidence of photographers all over the world because of its consistently high quality, great speed and maximum latitude.

Selochrome Roll Film is of the same high quality as Selo, but possesses greater speed and colour sensitiveness and is anti-halation backed to prevent light spread. This adds considerably to its usefulness.

For photography on dull days and in waning light Selochrome has no equal.

Selo Panchromatic Roll Film is fully colour sensitive and is extremely valuable for landscape photography. There is no deviation from the Selo standard of quality, and this film should be employed by all roll film camera users who require correct monochromatic rendering of colour in their pictures.

REGISTERED
TRADE MARK



ILFORD LIMITED, ILFORD, LONDON

SELO

SELO

The original fast film, possessing great latitude and colour sensitive properties. The perfect amateur film.

SELOCHROME

An extra fast, highly orthochromatic film, multi-coated, and having an anti-halation backing. The highly orthochromatic properties of Selochrome make brilliant snapshots possible under lighting conditions which would be disastrous with an ordinary film. For difficult subjects use Selochrome for safety.

SELO PANCHROMATIC

This film, particularly with a pale yellow filter, gives a true rendering in monochrome of all ordinary coloured subjects. It is clean working, of high speed, and consistent in quality. It will be welcomed by all photographers who appreciate the benefits conferred by the use of panchromatic emulsions.

REGISTERED
TRADE MARK

ILFORD LIMITED, ILFORD, LONDON



ILFORD

PAPERS

For Amateur Printing

SLÖGAS

Slōgas is essentially a paper for amateur use. It is easy and convenient to handle, yet it gives prints of excellent gradation, clean highlights and deep rich shadows. Any negative—weak, medium or dense—can be made to yield its best result on SLÖGAS.

SELTONA

COLLODION SELF-TONING PAPER

Seltona is a daylight printing paper which tones as it fixes and produces beautiful rich warm sepia tones. Immersion in a bath of common salt previous to fixing gives pleasing purple tones.

ENITONE

GELATINO-CHLORIDE

SELF-TONING PAPER

Enitone is a daylight printing paper of the gelatino-chloride type, and gives beautiful tones from red to purple by fixing only.

*Free booklets dealing with each of these papers
will be supplied on request.*

REGISTERED
TRADE MARK



ILFORD LIMITED, ILFORD, LONDON

ILFORD

X-RAY FILMS (Double Coated)

Ilford X-Ray Film is a product of the very highest quality and consistency, and enables the radiologist to make radiographs of the greatest possible diagnostic value.

Ilford X-Ray Film is double-coated with a special emulsion, which ensures high speed and rapid darkroom processing. It is also free from any tendency to abrasion and stress markings.

ILFORD X-RAY DENTAL FILM

This film is of the same high quality as Ilford X-Ray Film and will be found to be of the utmost possible assistance in all dental radiology.

The popular sizes ($1\frac{5}{8}'' \times 1\frac{1}{4}''$ and $1'' \times 1\frac{1}{4}''$) are available in a new form of packing which is very convenient in use and easy to open.

The following X-Ray literature is available post free on application :—

Ilford X-Ray Plates & Films.

Ilford X-Ray Accessories Catalogue.

Ilford Intensifying Screens for X-Ray Work.

REGISTERED
TRADE MARK



SELO

16 mm. CINE FILM Sub-Standard

Selo 16 mm. Cine Film gives facilities for making as many copies as are required from the original negative. It is non-reversal and therefore the negative is not subject to the "wear and tear" which would result from continued projection.

Selo 16 mm. Cine Film is panchromatic and gives an accurate rendering in monochrome of all the colours of the spectrum. It is free from graininess and gives a clarity of image which is unsurpassed.

Selo Cine Film is a film of outstanding quality and uniform consistency.



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TRADE MARK



ILFORD LIMITED, ILFORD, LONDON

SELO

35 mm. CINE FILM Standard

Selo 35 mm. Cine Film is being used in ever-increasing quantities in British Film Studios because of its extreme speed, high panchromatic qualities and reliability in processing.

In addition to Panchromatic Negative Stock there is available Cine Positive Stock, including Clear Sound Track Tinted Positive Film. This film is dyed after slitting and perforation over the picture area only, leaving a clear strip at the side for the sound record. This ensures that sound reproduction is absolutely pure and unimpaired.

Selo Cine Sales Dept. (National House, Wardour Street, London, W.1, Telephone : Gerrard 4125), will gladly supply details of all Selo Cine Standard Film Stock.



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ILFORD LIMITED, ILFORD, LONDON

ILFORD

Photographic Accessories

The following is a selection of photographic chemicals and accessories which Ilford Limited supply. A complete list will be gladly forwarded on application.

Ilford Dark Room Filters.
 Ilford Colour Filters.
 Ilford Infra-Red Filter.
 Ilford Exposure Meter.
 Certinal (Ilford Concentrated Liquid Developer).
 Ilford Professional Developer.
 Ilford M.Q. Packet Developer.
 Ilford Clorona Developer.
 Ilford Acid Hypo Fixing Salts.
 Desensitol (the Ilford Desensitiser).

The following publications are issued by Ilford Limited :—

Ilford Manual of Photography.
 Panchromatism (with Colour Chart).
 Ilford Manual of Process Work.

The following booklets will be supplied free on request :—

Ilford Plates & Films.
 The Making of Slides & Transparencies on
 Ilford Lantern Plates.
 Ilford Bromide & Clorona Papers and how
 to use them.
 Ilford Exposure Tables.
 Selo Roll Film Booklet.
 Slôgas Booklet.
 Seltona Booklet.
 Enitone Booklet.
 Selo 16 mm. Panchromatic Cine Film.

ILFORD LIMITED, ILFORD, LONDON

Telegrams : "Plates, Phone, Ilford"

Telephone : Ilford 3000 (20 lines)

A B C 4th, 5th & 6th EDITIONS
 MARCONI INTERNATIONAL

CODES :

BENTLEY'S COMPLETE PHRASE CODE

BENTLEY'S SECOND PHRASE CODE

ILFORD LIMITED, 'PRIVATE'

REGISTERED
 TRADE MARK





IMPERIAL • DRY • PLATE • CO • LTD
CRICKLEWOOD • LONDON • N.W.2

IMPERIAL PLATES •

have retained the confidence of photographers in all parts of the world for over 40 years because of their exceptionally high quality, wonderful keeping properties and exemplary behaviour even under unfavourable conditions.

Imperial Plates have characteristics which make them particularly valuable for every phase of photography—professional, process and amateur use—and can be depended upon to yield the best results it is possible to obtain.

A selection of the popular grades is given on the following page, but further details may be had on application.



IMPERIAL • DRY • PLATE • CO • LTD
CRICKLEWOOD • LONDON • N.W.2

IMPERIAL PLATES •

Studio, Press, and Commercial Photography

	H. & D.
S.S.S. Press Ortho	850
Eclipse Ortho Soft	850
Eclipse Soft	850
Eclipse Ortho Soft	650
Eclipse Ortho	650
Eclipse	650
S.S.S. Press Ortho	600
S.S.S. Press	600

Panchromatic

Eclipse Panchromatic Soft	850
Eclipse Panchromatic B Plates	400
Panchromatic Process	70

Process Work, Copying, etc.

Panchromatic Process	70
Process	25
New Series Process	10-15
Non-Filter Process	30-40
Fine Grain Ordinary	40
Ordinary	80-100

Amateur Photography

Special Rapid	250
Special Rapid Ortho	250
Special Sensitive	300
Special Sensitive Ortho	300
Non-Filter	250
Non-Filter New Series	450

IMPERIAL • DRY • PLATE • CO • LTD
CRICKLEWOOD • LONDON • N.W.2



IMPERIAL FLAT FILMS

For Process Work, Copying, etc.

These films are especially manufactured for Photomechanical Work, copying, etc., and are of the utmost utility. They possess all the fine characteristics of Imperial Plates and will not fail to respond to all demands made upon them. They have been used by many of the leading Process Engravers and Commercial Houses with unflinching success for many years.

The following is a list of Imperial Films. Further details will be supplied on application.

Process New Series	..	H & D 10/15
Process E Thin Base		
*Fine Grain Ordinary	..	H & D 40
*Ordinary .. ..	..	H & D 80/100

*These films can be supplied Matt to order.



IMPERIAL • DRY • PLATE • CO • LTD
CRICKLEWOOD • LONDON • N.W.2

TELEPHONE: GLADSTONE 4286

TELEGRAMS: "IMPEOPLE, CRICKLE, LONDON"

LONDON'S LEADING DEALERS in GOOD *Second-Hand*

CAMERAS

Established in 1874, we are still the **Premier House** for reliable **Second-hand Photographic Apparatus**. Whatever make or type of camera, etc., you may wish to buy, we can usually supply at a **money-saving price**.

All **Second-hand apparatus** we sell has been thoroughly overhauled by **skilled mechanics** in our own workshop. When you order a second-hand camera from us you can do so with the same confidence as if you were here "**Just off the Strand**" in person. Our business has grown steadily, mainly as the result of the **recommendations of satisfied customers**.

From the manager, who will see your letter and supervise the execution of your order, to the packer who will see to the despatch of the goods, **our staff will give your instructions that personal interest** which will add another satisfied customer to the thousands on our books.

A client wrote us a few days ago as follows:—

"I am writing now to say that the Bell Howell outfit I purchased from you last July is all that you said—a beautiful outfit. I may also say that I am extremely proud of it and you have sold me a second-hand article absolutely, as you stated, in perfect condition. I have been a customer of yours since you were in Cranbourn Street, which must be over forty years ago."

During the course of a year we receive many similar testimonials from customers in all parts of the world. The limitations of space prevent our printing even a selection from them here.

SANDS HUNTER & CO.
LTD
37 BEDFORD ST, STRAND, W.C.2

SOME SECOND-HAND CAMERA BARGAINS FROM LONDON'S LARGEST SELECTION

SECOND-HAND FOLDING PLATE CAMERAS.

4½ × 3½ in. Voigtlander Tourist, double extension, 5½ in. Heliar F/4.5 lens, Compur shutter, 3 plate-holders, in brand new condition, list price **£19 10s. 0d.** for ... **£12 17 6**

4½ × 3½ in. Sinclair Una, double extension, 5 in. Ross-Zeiss Convertible Protar lens, F/6.3, Compound shutter, 4 double plate-holders, leather case, in excellent condition, list price about **£25** for ... **£12 10 0**

6½ × 4½ in. Tropical Sanderson, reversing back, extra long extension, 7 in. Goerz F/6.8 Convertible Dagor lens, Koilos shutter, Telenegative attachment, 3 double plate-holders, leather case **£17 12 6**

4½ × 3½ in. Zeiss Ikon Tropical Adoro, polished teak wood body, double extension, Carl Zeiss F/4.5 Tessar lens, Compur shutter, 3 plate-holders, film-pack-holder, in brand new condition, ... **£17 12 6**

4½ × 3½ in. Tropical Sanderson, reversing back, Carl Zeiss F/4.5 Tessar lens, Compur shutter, 3 double plate-holders, film-pack-holder and leather case, in good condition ... **£10 12 6**

4½ × 3½ in. Goerz Tenax, double extension, Goerz F/4.5 Convertible Dogmar, Compur shutter, film-pack-holder and leather case, list price about **£15**, for ... **£15 6**

4½ × 3½ in. Newman & Guardia Ideal Sibyl, Ross F/4.5 Xpres lens, N & G. Patent shutter, 12 plate-holders, film-pack-holder, leather case, in good condition, list price **£29 10s. 0d.**, for ... **£17 12 6**

4½ × 3½ in. Sands Hunter Universal, polished mahogany body, revolving back, long extension, 135 m/m Carl Zeiss F/4.5 Tessar lens, Compur shutter, 3 mahogany bookform plate-holders, film-pack-holder and leather case, list price **£25**, for ... **£12 12 0**

10 × 15 c/m Zeiss Ikon Maximar, all metal body, double extension, Carl Zeiss F/4.5 Tessar lens, Compur shutter, 6 plate-holders, film-pack-holder, leather case, in first class condition, list price over **£20**, for ... **£11 15 0**

Postcard Adams Verto, double extension, 6 in. Ross F/5.5 Combinable, single lenses, 10½ in. focus, Adams shutter, Graflex rollfilm-holder, colour filter, pigskin case, in first class condition, list price about **£45**, for ... **£17 10 0**

SECOND-HAND ROLL-FILM CAMERAS.

4½ × 2½ in. Newman & Guardia Sibyl Excelsior, Ross F/4.5 Xpres lens, leather case, in first class condition, list price **£34**, for ... **£19 10 0**

Postcard Goerz Tenax, Goerz F/4.8 Dogmar lens, Compur shutter, in good condition ... **£8 17 6**

4½ × 3½ in. Stereo Co's Kings Own de Luxe, Goerz Convertible Dagor F/6.8 lens in Velute shutter, plate attachment with focussing screen, 3 double bookform plate-holders, leather case, all in first class condition ... **£10 0 0**

Postcard 3a Special Autographic Kodak, Zeiss Kodak F/6.3 Anastigmat lens, Compound shutter, in good condition **£7 18 6**

Postcard Adams Vesta, Ross Zeiss F/4.5 Tessar lens, Compound shutter, focussing screen, film-pack-holder, list price **£47**, for ... **£15 12 6**

4½ × 3½ in. Newman & Guardia New Ideal Sibyl, Ross F/4.5 Xpres lens, in good condition, list price **£32 5s.**, for ... **£17 10 0**

Leitz Leica, Hektor F/2.5 Anastigmat lens, Leitz Range Finder and leather case, in good condition ... **£13 10 0**

Newman & Guardia V.P. Sibyl, Ross Zeiss F/4.5 Tessar lens, list price, **£20**, for ... **£9 15 9**

3½ × 2½ in. Dallmeyer Pentac, Pentac F/2.9 Anastigmat lens, Compur shutter, full-size direct vision view finder, rising and cross front, in good condition, list price, **£17 17s. 0d.**, for ... **£9 10 0**

4½ × 2½ in. Zeiss Ikon Icarette, Carl Zeiss F/4.5 Tessar lens, Compur shutter, full-size direct vision view finder, in good condition, list price **£11 10s. 0d.**, for ... **£7 12 6**

4½ × 2½ in. 1a Special Autographic Kodak, Bausch & Lomb Kodak F/6.3 Anastigmat lens, Kodamatic shutter, in good condition ... **£7 15 0**

V.P. Ernemann, Ernostigmat F/6.8 lens, 3-speed shutter, in new condition, list price **£5 12s. 6d.**, for ... **£3 3 0**

4½ × 3½ in. Ica Halloh, Carl Zeiss F/6.3 Triotar lens, Compur Shutter, rising and cross front, in new condition, list price **£11**, for ... **£4 12 6**

Leitz Leica, Elmar F/3.5 lens, Leitz Range Finder and leather case, in good condition ... **£11 15 0**

SECOND-HAND FIELD CAMERAS.

6½ × 4½ in. Thornton-Pickard Royal Ruby, 7.6 in. Dallmeyer F/6 Convertible Stigmatic lens, Roller Blind shutter, 3 bookform plate-holders, threefold tripod, case, in good condition, list price about **£30**, for ... **£12 15 6**

6½ × 4½ in. Houghton Triple Victo, 7.6 in. Cooke Series III F/6.5 lens, Extension lens 11.7 in. focus, 3 bookform plate-holders, threefold tripod, canvas case, in good condition ... **£7 12 6**

6½ × 4½ in. Watson Acme, 7½ in. Watson F/6.5 Convertible Holostigmat lens and a 4.2 in. Wide Angle Holostigmat, Roller Blind shutter, 3 bookform plate-holders, tripod, case, in good condition **£13 12 6**

6½ × 4½ in. Tropical Sanderson 7 in. Goerz F/6.8 Anastigmat lens, in Goerz Sector shutter, 3 bookform plate-holders, tripod canvas case, in good condition **£13 10 0**

6½ × 4½ in. Ross Conical Bellows, 3 bookform plate-holders, turntable, tripod, canvas case, without lens... **£4 18 6**

6½ × 4½ in. Thornton-Pickard Royal Ruby, 8½ in. Cooke Series III F/6.5 Anastigmat lens, and Extension lens, Roller Blind shutter, 3 bookform plate-holders, tripod, canvas case, list price about **£35**, for ... **£18 12 6**

8½ × 6½ in. Thornton-Pickard Royal Ruby, 6 bookform plate-holders, threefold tripod, stiff canvas carrying case, without lens, list price **£55**, for ... **£25 0 0**

6½ × 4½ in. Watson Premier Square Bellows, 8½ in. Ross-Goerz F/6.8 Convertible Anastigmat lens, Roller Blind shutter, 4 bookform plate-holders, leather case ... **£10 15 6**

10 × 8 in. Hare Square Bellows, brass-bound mahogany body, double extension, 4 bookform plate-holders, reversing and swing back, leather case, good condition, without lens... **£9 10 0**

12 × 10 in. Marion Square Bellows, aluminium bound model, 6 double bookform plate-holders, substantial threefold tripod, all contained in three leather cases, in excellent condition, list price over **£40**, for ... **£17 10 0**

15 × 12 Marion Perfection, 20 in. R.R. lens, 3 double bookform plate-holders, case ... **£15 15 0**

SECOND-HAND REFLEX CAMERAS.

3½ × 2½ in. Thornton-Pickard Special Ruby revolving back 5 in. Cooke F/3.5 lens, also 11 in. Ross F/5.5 Teleros Telephoto lens, 3 double plate-holders, film pack-holder, Colour filters, lens hood, leather case. The whole outfit in first class condition, list price over **£40** for **£21 0 0**

Postcard Rollfilm Graflex, 7 in. Cooke F/4.5 lens, leather case, camera takes postcard size roll-films, good condition, list price **£34**, for ... **£13 10 0**

5 × 4 in. Kodak Graflex, 7 in. Carl Zeiss F/4.5 Tessar lens, 3 double plate-holders, leather case, in good condition, list price about **£30**, for ... **£12 15 6**

10 × 15 c/m Mentor Folding, 165 m/m Carl Zeiss F/4.5 Tessar lens, 3 double plate-holders, film-pack-holder, leather case, in excellent condition, list price about **£40**, for ... **£15 15 0**

3½ × 2½ in. Inagee Folding, 12 c/m Carl Zeiss F/4.5 Tessar lens, film-pack-holder, 6 plate-holders, leather case, in good condition, list price **£40**, for **£18 12 6**

3½ × 2½ in. Newman & Guardia Folding, revolving back, F/4.5 Ross Xpres lens, 3 double plate-holders, film-pack-holder, lens hood, leather case, in excellent condition, list price **£53 7s. 6d.**, for **£30 0 0**

4½ × 3½ in. Newman & Guardia Square Reflector, revolving back, long extension, 5½ in. Carl Zeiss F/6.3 Convertible Protar lens, Changing Box for 12 plates, 3 double plate-holders, leather case, original price about **£40**, for ... **£18 17 6**

3½ × 2½ in. Kodak Series B Graflex, revolving back model, Kodak F/4.5 Anastigmat lens, film-pack-holder, good condition, list price **£28**, for **£13 17 6**

4½ × 3½ in. Tropical Soho, revolving back, Cooke F/3.5 Anastigmat lens, 3 double plate-holders, film-pack-holder, leather case, all in good condition, list price **£48**, for ... **£27 17 6**

5 × 4 in. Adams Minex, revolving back, 8½ in. Ross F/4.5 Xpres lens, film-pack-holder, leather case, in very good condition, list price about **£70**, for ... **£23 10 0**

4.5 × 6 c/m Baby Soho, revolving back, Cooke F/3.5 Anastigmat lens, 3 double plate-holders, film-pack-holder, leather case, in excellent condition, list price **£34 12s. 6d.**, for ... **£22 10 0**

CINÉ APPARATUS

CAMERAS

16 m/m Ensign Super Kinecam, Turret Head model, F/2.6 Cinar Anastigmat lens, leather case, in first class condition, list price **£45,** for

£27 10 0

35 m/m De Vry, 2 in. Dallmeyer F/3.5 Dalmac lens, camera takes 100 ft. of daylight loading film, spring motor running 50 ft. of film at one winding, good condition **£25 0 0**

16 m/m Bell & Howell Filmo 70, 1 in. Cooke F/3.5 Anastigmat lens, leather case, list price **£55,** for

£27 10 0

35 m/m Debie, Carl Zeiss F/3.5 Tessar lens, leather case, in good condition. The popular professional camera ... **£35 0 0**

35 m/m Bell & Howell Eyemo, camera takes 100 ft. reels of daylight loading film, spring motor running 100 ft. in two winds, two speeds 8 and 16 exposures per second, 47 m/m Cooke F/2.5 Anastigmat lens, leather case, list price **£120,** for

£45 0 0

16 m/m Model B Cine Kodak, F/6.5 Anastigmat lens, camera takes 50 ft. or 100 ft. of film, list price **£18 18s. 0d.** for ... **£4 12 6**

16 m/m Zeiss Ikon Kinamo S. 10, Carl Zeiss F/2.7 Tessar lens, the smallest 16 m/m camera on the market, in new condition, list price **£24,** for ... **£12 0 0**

16 m/m Model BB Cine Kodak, F/1.9 Anastigmat lens, colour filter, leather carrying case, in first class condition, list price **£30,** for

£15 10 0

16 m/m Model B Cine Kodak, Kodak F/3.5 Anastigmat lens, good condition, list price **£25,** for

£11 10 0

35 m/m Williamson, Carl Zeiss F/3.5 Tessar lens, 6 100 ft. spare spool boxes, leather cases, in good condition

£12 15 0

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*THE YEAR BOOK OF PHOTOGRAPHY AND AMATEURS' GUIDE
AND THE PHOTOGRAPHIC ANNUAL*

1933

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INFRA-RED PLATES AND FILTERS IN PHOTOGRAPHY.

BY THE EDITOR.

The prominence which "infra-red photography" received during the past twelve months has had one good result beyond the new photographic facilities which have come into use. It has made us realise the marvellous fact of the universe in which we live as summed up in the one word—radiation. From its place in space 95 million miles away, the sun "radiates" all the energy by which we live and move and have our being. Not only the heat which from day to day promotes life on our planet, nor the light which plays its part in the growth of living things, but the energy which in past æons has changed its form into that of chemical combination and has lain stored as coal, oil and other substances which man, in the course of his evolution, has learnt to convert again into energy (heat, light, electricity) in forms more directly useful to the human race than the radiant energy which hour by hour reaches our earth from the sun.

COMPOSITE LIGHT.

The nature of this energy and the means by which it flings itself across those 95 million miles of hollow space in nine minutes of our time have been the subject of speculation and enquiry by natural philosophers from time immemorial. The beginning of real knowledge was when Isaac Newton, in 1666 (when he was 23), showed that the white light of the sun, when passed through a prism, was split into light of violet, blue, green, yellow and red colours, and that light of these colours could be combined to form white light. Sunlight was something composite, and Newton, at the time of this discovery, was concerned, "not to explain the properties of light, but to prove them by reason and experiment." Nevertheless he conceived light as a stream of particles—violet rays, the smallest particles, and red rays, the largest.

WAVE TRANSMISSION.

For a hundred years after Newton's death, in 1727, so great was his authority, light continued to be regarded as the emission of streams of particles, and the science of optics remained in the doldrums, ill-nourished by this so-called "emission" theory which it was heresy to doubt. Then in 1830 Thomas Young, a physician by profession and a genius in science, established that under certain conditions you could

add light to light and get darkness. Plainly that seemed at that time utterly inconsistent with the idea of light as a flight of particles. What kind of motion could it be that could extinguish its effect when coupled with another of like kind? Young conceived that light was a wave motion and explained the disappearance of light in his experiment by the super-imposition of the crests of one set of waves on the troughs of another set. An elegant and fruitful theory, for it has led to the development of optics in endless directions. Yet purely a theory, and one which present-day physicists find difficult for the explanation of some of the latest discoveries.

However, we have come to conceive of radiation as a wave motion and to connect the different kinds of radiation with waves differing in their length, viz., the distance from crest to crest. Young, from Newton's observations, worked out the lengths, and a French civil engineer, Fresnel, as a distraction from the humdrum business of making roads, established the theory so firmly that one would think that the wave movement of light and other radiation was something somebody had seen, not a figment of the scientific imagination.

Yet the theory assigns definite (very small) dimensions to these waves, namely $\cdot 000025$ in. for red light; $\cdot 000021$ in. for green, and $\cdot 000017$ in. for violet. In other words, if we imagine a series of waves rippling across the $3\frac{1}{2}$ -in. width of the type on this page, there would be about 140,000 of them for red light, 166,000 for green and 206,000 for violet.

One is staggered by the boldness of Young's conception. These waves, hundreds of times smaller than the smallest object that can be seen in the highest-powered microscope ever made, are visualised as travelling undeviated through space. But waves in what? The answer of the theorist is: Waves in a medium which, to our senses, is infinite nothingness, without weight or substance, yet infinitely elastic, penetrating the interspaces in gross matter and eternally in the tremor of vibration as energy strikes it. That, in a sentence, is the stupefying theory of radiation, so fantastic in conception (perhaps not, to the mathematician), but extraordinarily fruitful in explaining and advancing the knowledge of the most diverse optical phenomena.

ULTRA-VIOLET.

The rays mentioned above are those of the kinds of light making up the visible spectrum—the rays by which our eyes can see—ranging from the short violet waves to the red rays of wave-length nearly half as long again. But, as was shown by Ritter, in 1801, beyond the violet of the spectrum are rays



BEN LOMOND, FROM STIRLING, 25 MILES DISTANT. TAKEN ON AN ILFORD
INTRA-RED PLATE WITH TAYLOR-HOBSON COOKE LENS.

Reproduced by permission of *The Times*.

invisible to the eye. The presence of these ultra-violet rays was shown by their darkening action on silver chloride. Herschel christened them "actinic" (the rays which produce chemical action), and until emulsion-makers produced "colour-sensitised" plates, they and the visible blue and violet were the rays in white light which chiefly produced photographic action. Young measured their wave-length and found it less than that of visible violet light. Since then, others have shown the emission from an electric arc of rays beyond the ultra-violet of as short a wave-length as $\cdot 0000004$ in., but radiation of this extreme shortness of wave does not take part in photography, since rays from the sun of eight times this wave-length are absorbed by the earth's atmosphere, and moreover the glass of our lenses and the gelatine of the emulsion absorb rays of wave-length 16 times as great. For photography by ultra-violet light of ultra-short wave-length, lenses of quartz or fluorite and plates made without gelatine must be used.

Yet the shortness of wave-length of these extreme ultra-violet rays—one $2\frac{1}{2}$ -millionth of an inch in length—is transcended by the radiation (X-rays) from a Crookes tube. The wave-length of X-rays ranges from one 8-millionth to one 8,000-millionth of an inch, values which render intelligible their power of passing through many solid objects and of revealing the atomic structure of crystals, since their dimensions are comparable with those of the atoms in a crystal.

INFRA-RED.

But to return to the rays of the sun's spectrum. Beyond the visible red, as detected by Herschel in 1800 with a thermometer, are invisible rays which manifest their existence chiefly by their conversion into heat. They are of much greater wave-length, and, while present in the radiation given out by every source of light, are emitted by every hot substance. Such infra-red rays from a boiling kettle are said to have a wave-length of 3-10,000ths of an inch, or about 12 times the wave-length of rays in the visible red of the spectrum, but the infra-red rays in daylight or artificial light which are utilised in photography are of considerably shorter wave-length—in the neighbourhood of 3 to 4 100,000ths of an inch.

INFRA-RED PHOTOGRAPHY.

The first important demonstration of infra-red photography was that by Professor R. W. Wood in the Traill Taylor memorial lecture of 1910. Professor Wood obtained his very striking infra-red photographs of landscapes by means of the very inadequate sensitive material then available, and

his exposures with an $f/8$ lens and his filter of dense cobalt glass were about 10 minutes in bright sunlight. Since then, and chiefly during the past few years, the dye chemists have invented dyes which sensitise the dry-plate emulsion very much further into the infra-red and have enabled the makers of emulsions to produce plates and films of immensely greater sensitiveness to infra-red. Emulsions by at least three makers are now regular articles of commerce; filters transmitting infra-red and absorbing other radiation are now available, and lenses corrected for infra-red have been designed so that the practice of this branch of photography is no longer a *tour-de-force*, but a thing which anyone can take up.

It is convenient to consider infra-red photography as comprising two divisions:—

(1) Photographing by the infra-red rays contained in daylight.

In this work the lens must be provided with a filter which is transparent to infra-red rays, but opaque to practically all other rays which affect the infra-red-sensitive plate.

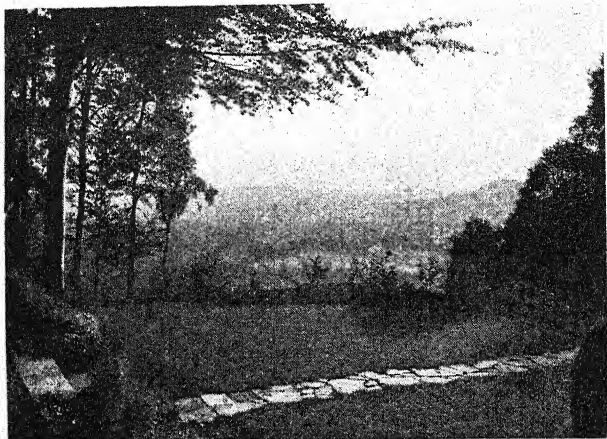
(2) Photographing by the "light" from a generator of infra-red rays.

In this branch, the source of rays may be provided with a filter which cuts out rays other than the infra-red, and if this absorption is complete the radiation which is transmitted cannot be recognised by the eye. Such "illumination" is darkness, so far as our eyes are concerned, but, as will be seen later on, photography may be done under such circumstances by means of the emulsions sensitised to the infra-red rays.

We may now turn to some of the uses already made of infra-red photography of these two kinds.

LONG-DISTANCE PHOTOGRAPHY.

As every one knows, objects at a very great distance are seen indistinctly by the eye, even on a moderately fine day in the humid climate of England, and are still more indistinctly rendered by the ordinary photographic plate. The most perfect lens does not help matters in this respect, for the cause has nothing to do with the lens. It is the behaviour of the rays of light in their passage through the atmosphere to the camera. If this intervening space were of the crystal clearness, such as prevails in many places on a bright frosty day, rays from an object would travel to the lens without suffering any appreciable change by the atmosphere. But as a rule the atmosphere is slightly turbid, due to the moisture suspended in it, and in the neighbourhood of towns it is more turbid



From negative on an Ilford Ordinary plate.



From negative on Ilford Infra-red Plate with infra-red filter.
By courtesy of Ilford, Ltd.

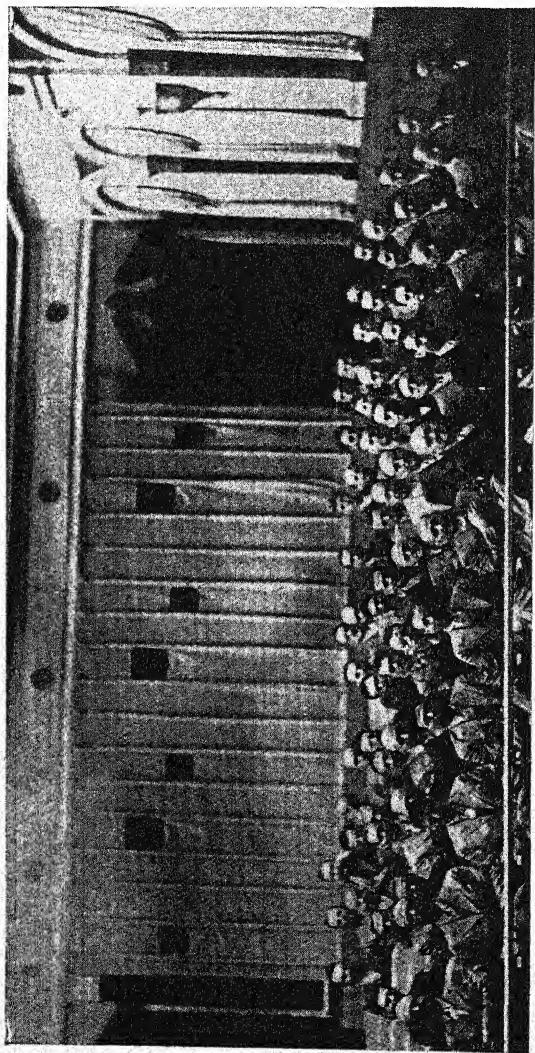
still from smoke and dust. These fine particles exert a scattering effect on the rays, that is to say, part of the light from some one point in the object is diverted in various directions, and some of these secondary rays reach the lens as though they came from an adjoining point in the object. It is obvious that this effect reduces the contrast of the image formed by the lens, and as it is only by the contrast of its tones that an object is rendered visible, this "muzzing" of the rays leads to reduced visibility of small distant objects in the photograph, or to complete invisibility, they merge into one even tone.

To this effect is added the further one that the layer of atmosphere, when illuminated by this scattered light, forms, so to speak, a screen which is photographed on the plate as an even low density, thus further reducing the contrast of the image of the distant part of a landscape.

Now these scatter actions take place to a much more pronounced degree with light of short wave-length than with that of long wave-length. It has been determined, for example that on passage through 5 miles of atmosphere the transmission to the camera of image-forming rays (violet) of 400 ten-millionths of a centimetre is 50 to 70 per cent., as against 80 to 90 per cent. for waves (orange-red) of 600 units. With infra-red rays of wave-length 800 to 900 units, the percentage of transmission is much greater. For want of a better analogy we may conceive the short violet waves as behaving like a baby car of short wheel-base that dodges and bounces about when driven at speed whilst the long infra-red waves, like a big Rolls or Hispana of 12 ft. wheel-base, ride as steadily as a train de luxe as its speedometer tops 70.

As a result of this property of infra-red rays, photographs have recently been taken at distances hitherto beyond the range of ordinary photography. At the last exhibition of the Royal Photographic Society was shown an aerial photograph of Mt. Shasta taken by Captain A. W. Stevens of the United States Air Service from an altitude of 23,000 ft. at a distance of 331 miles. The exposure on an Eastman Kryptocyanine film, with a 20-inch lens at $f/5$ aperture and when using the Wratten 89A filter was $1/5$ sec. At this very great distance the mountain was quite invisible to the photographer.

The most eloquent examples of long-distance photography by infra-red are the series taken by *The Times* staff during last year, of subjects in the British Isles and published at intervals in *The Times*. These, in all cases were taken with a long-focus lens specially designed by Taylor, Taylor & Hobson for correction to infra-red and on the Ilford Infra-red



Photograph taken in complete darkness by infra-red rays (Kodak Research Laboratories Rochester, N.Y.)
For exposure, etc., see page 139.

plates, manufactured as the result of the discovery of a new sensitising dye in the Ilford laboratories. In several of these the coast of France was plainly rendered in a photograph taken from Dover. By courtesy of *The Times* I am able to reproduce one of Ben Lomond, in the Scottish Highlands taken from Stirling at a distance of 25 miles. Tourists in Scotland know that the climate of that most picturesque country frequently makes long-distance photography by ordinary methods a very difficult thing, for the atmospheric moisture which seldom deserts this mountain country is a fatal obstacle to "clear" photography at long range.

The pair of photographs (p. 134) of the same subject by Ilford Ltd., usefully illustrate the great superiority of the infra-red rays in rendering distance. The upper one was taken on a Ilford ordinary plate, while below will be seen the result on an Ilford Infra-red plate exposed through the special filter for transmission of infra-red and absorption of most other rays.

SNOW AND NIGHT EFFECTS.

In *The Times* picture (p. 131) the rendering of the green fields as white as snow will be recognised as a feature of the infra-red photograph, in which bright green vegetation, such as grass or young foliage, always comes out white. This arises from the fact that the chlorophyll, which is the colouring matter of plants, almost completely reflects infra-red rays. Thus, in the scheme of Nature, growing vegetation escapes the ravage which would be wrought if it absorbed the heat-producing infra-red rays from the sun. The effect is strange and so has been called "unnatural." It is of course, perfectly natural. The infra-red emulsion "sees" green fields or foliage by rays to which our eyes are entirely insensitive. I leave to the pictorialists the satisfaction of quarrelling about the fitness of the infra-red rendering as a medium of expression. Some may scorn it, but if one may judge of the attitude of many of the moderns towards, for example, perspective, they will rejoice in it, and one may almost prophesy a glut of infra-red pictures which will bear out the parody:—

"Painting the thing as it isn't"

For the Gods of things as they ain't."

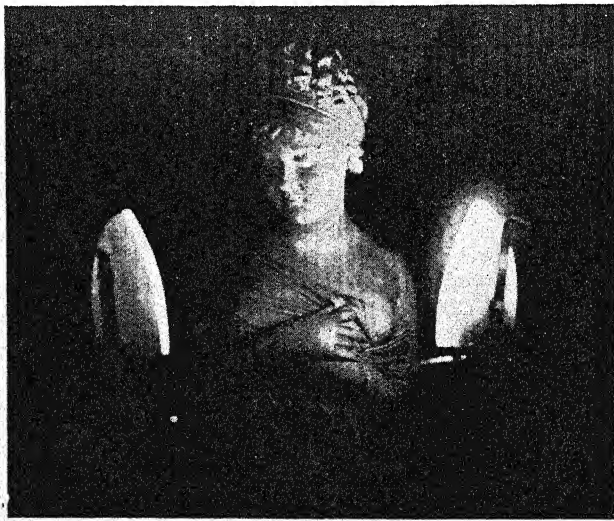
There is another effect to which the infra-red plate lends itself, provided the lens-filter excludes other rays, and that is the taking of night effects in full daylight. The pure blue sky comes out black in the photograph, since blue rays are cut out by the red filter. In this way effects simulating moonlight are readily made in clear bright daylight. The cinema people have already been taking advantage of this

method by using negative films, e.g., Kodak K and Agfa R, sensitive to infra-red. It is one more of the endless examples that the effects seen on the cinema screen are not what they purport to be.

PHOTOGRAPHY IN DARKNESS.

The production of emulsions sensitive to rays beyond the range of perception of the human eye naturally renders possible the taking of photographs in complete (visual) darkness. We have only to "illuminate" a subject solely by invisible rays (infra-red or ultra-violet) and use a plate or film of appropriate sensitiveness in order to realise a process of "photography in the dark" such as has long been taken for granted by writers of sensational fiction.

Many years ago Abney described the preparation of collodion emulsion so sensitive to the long waves of the infra-red that he had been able, he stated, to photograph a kettle of boiling water solely by its own radiation, that is to say in the dark. Nobody seems to have confirmed this most remarkable achievement, which would have required the plates to have been exposed as soon as made and would also have called for means for keeping them ice-cold. An emulsion sensitive to the radiation from a body at a temperature of only 100° C. would

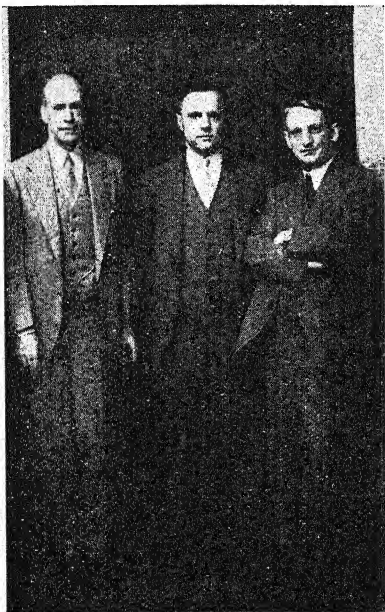


Bust photographed by the "light" of two electric irons (Kodak Research Laboratories). See page 140.

almost inevitably be affected by that from the human body. Yet Abney makes no mention of the practical difficulties in his reference to the matter.

According to a recent paper by a German bibliographer, the first published account of the taking of a photograph in complete darkness was that L. V. Dodd,* who used the light of a mercury tube, filtered from its visible rays. Ultra-violet, however, is less suitable than infra-red for this purpose, owing to its absorption by the glass of the lens and the gelatine of the plate. Infra-red rays, besides being more readily available

in the light of tungsten-filament lamps are free from these drawbacks and were used for "the first photograph of a public gathering ever made in complete darkness" taken by the Kodak Research Laboratories in Rochester, N.Y., on October 7th, 1931, and shown at the 1932 exhibition of the Royal Photographic Society. The audience shown in this photograph (p. 136) consisted of banking and other magnates on a visit to the Kodak works, and the "lighting" was tungsten lamps, at the rate of 1 kilowatt per 100 sq. ft. of floor space, screened by the Wratten No. 87 filter. The exposure was 1 sec. at $f/3.5$ on an Eastman Infra-red A plate (hyper-sensitised).



Photograph in the dark by infra-red. Exposure, 5 secs. at $f/3.5$. (Kodak Research Laboratories.)
On right, Dr. C. E. K. Mees.

Those attending the lectures by Mr. Olaf Bloch, of the Ilford Research Laboratories, on infra-red photography have been able to witness demonstrations of this kind, in which members of the audience were photographed in almost complete dark-

* "British Journal of Photography," 1928, Feb. 24, p. 114.

ness by the infra-red rays from three screened 1,500-watt gas-filled lamps with an exposure of about 5 secs. at $f/8$ on Ilford Infra-red plates.

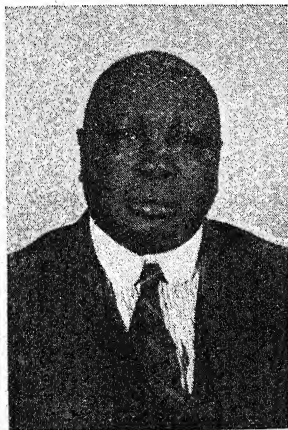
In the photograph of the bust on p. 138, also by the Kodak Research Laboratories, we have an example of "illumination" by infra-red rays from a source at a relatively low temperature, viz., two electric irons, run in the ordinary way and thus at about 400°C . An exposure of 1 hour at $f/4.5$ was given to the Eastman Infra-red A plate for this entirely invisible subject. The glow and halo of the irons in the photograph are due to radiation of invisible infra-red (heat) rays.

Beyond the "stunt" of these "darkness" photographs—nobody wants to be photographed in the dark—lie other applications of the method which undoubtedly will be of great value. Coupling the invisibility of infra-red rays with their power of penetrating mist and haze, it is clear that the infra-red-sensitive plate supplies a method of signalling which may be of immense value in navigation. It is discussed as an important power in warfare, an instrument fortunately which is already in the hands of every nation. More sensational uses, such as the portraiture of burglars, unknown to themselves, whilst professionally employed, may be left for a while.

Prophecies, by the somewhat random writers in the daily newspapers, of what is likely to be shortly accomplished by the use of infra-red-sensitive plates need to be taken with a considerable "grain of salt." It must be borne in mind that the advances which have been made constitute an emulsion which is enormously more sensitive to infra-red radiation. Even so, that does not amount to much unless infra-red rays arrive at the camera lens largely unmixed, for the reasons which have been stated, with rays of short wave-length. In other words, infra-red photography requires either a generator of these rays to the practical exclusion of others, or the use of a filter by which other rays are absorbed. Omission to recognise this simple fact is the cause of many of the preposterous statements made concerning this important advance. We must also contemplate methods by which infra-red rays act at "secondhand," so to speak, on the photographic plate. The photo-electric cell, among its multifarious applications, may be used as a receiver of infra-red radiation, which it will convert into ordinary light. One would be rash to set a limit to what can be done in this way in detecting and recording extremely feeble radiations.

IN RESEARCH.

To the astronomer and spectroscopist, the power of recording radiation extending far beyond the visible red must necessarily mean an immensely wider scope of observation. At the Lick observatory, for example, they have recently found stars in the nebula of Orion never previously recorded in their photographs. By using an infra-red plate and filter passing only infra-red, they were able to single out the images of faint stars from that of the nebula, the light from which is almost all blue-green and visible red.



Photographs by Ilford, Ltd.

Taken on ordinary plate.

Taken by infra-red rays.

A further wide avenue to knowledge is opened by the differences exhibited by various bodies in reflecting infra-red rays. Mention has been made above of the behaviour of green vegetation in this respect. It is already known that many substances reflect infra-red quite differently from white light. Some clean-shaven men, for example, appear in an infra-red photograph with an incipient growth of beard, and I am indebted to Ilford, Ltd., for the pair of photographs of a negro reproduced on this page. In the one taken by infra-red light, the Mongolian characteristics which are distinctly shown will interest students of ethnology. The infra-red-sensitive plate is a detector of the relative absorption and reflection of the heating rays, and thus has many possible

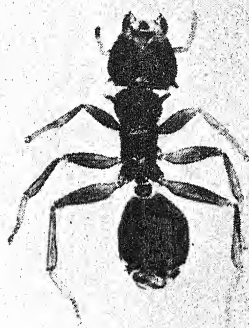
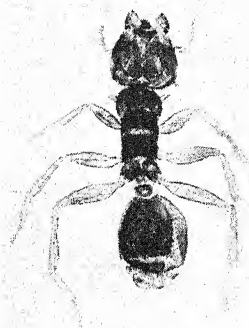


Photo-micrographs by Ilford, Ltd.

Infra-red plate and filter.

Panchro plate and filter.

applications in disclosing differences in tone which are undetected by the eye or the ordinary photographic plate.

In photographing in the microscope also, the selectively penetrative action of these long-wave rays has contributed to an astonishing improvement in the technique of recording the infinitely small. An example, again by courtesy of Ilford, Ltd., is the photo-micrograph of the New Zealand speckled ant made with an infra-red plate and filter as compared with that taken with a panchromatic plate and red filter. The infra-red discloses the organs of the specimen in a way recalling an X-ray photograph, whereas details are almost absent in the companion print obtained with light of considerably shorter wave-length.

BETTER SNAPSHOTS

By DAVID CHARLES.

There is not the slightest need in these days (nor ever was) for a professional photographer like myself to assume condescension towards the snapshotter. When the professional

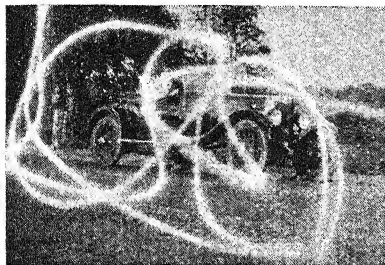


Fig. 1.

saunters forth for the first time or two with a hand-camera he is likely to get no better bag than the rawest tyro.

Of course, it all depends what one regards as successful snapshotting. Twelve to the dozen technically perfect films may be one man's idea of satisfaction, while another will

consign eleven of them to the dustbin with glee, provided that the twelfth is a "winner." The second individual is the more likely to possess an album upon which his friends' enthusiasm need not be politely assumed. Snapshotting, to my mind, essentially involves the taking of a sporting chance, for subjects worth snapping often pop up suddenly like a rabbit out of a hole, and disappear as suddenly, or else their characteristics that struck the eye dissolve into commonplace.

THE ART OF SNAPSHOTTING.

Half the art of snapshotting consists in being "ready on the trigger" when the subject worth snapping appears; the other half, in recognizing that worth. Of course, it is necessary to know the conditions that would make the exposure hopeless, but in most other directions too much caution, while raising the number of "correct exposures," is liable to result in a monotonous lack of the



Fig. 2.



Fig. 3.

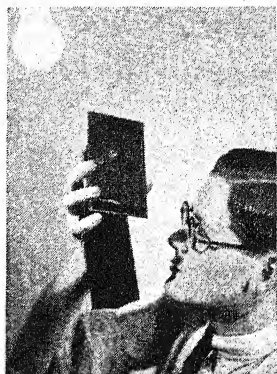


Fig. 4.

spontaneity which is the essence of a successful "snap."

TROUBLES THAT NONE ESCAPE.

Experienced and beginner alike are liable to technical troubles of all sorts. Lucky is the snapshotter who goes entirely scot free. It is intensely interesting, of course, but scarcely delightful to get a string of results like fig. 1, as though some "time-and-motion-study" expert had been using one's spools. Fortunately, this is one of the rarer diseases.



Fig. 5.

It is caused either by a tiny hole in the bellows

or body of the camera (perhaps a screw has worked its way out), or by a similarly small hole in the shutter, arising from some grit that has prevented it from closing properly. This line effect is the image of the sun moved over the film while the camera is waggled in the hand. If it occurs often, or alternates with



Fig. 6

foggy negatives (image of the whole sky similarly "waggled"), look for the hole. If rarely, look for it, too, for it is sure to get worse.

PREVENTION.

The man who takes the trouble periodically to give his camera an occasional critical examination will prevent visitations of this kind. Special times for this



Fig. 9.

precaution are on return from holidays, and, if the camera has been laid aside, before again putting it into use.

"Tramlines," *i.e.*, parallel fine black lines on films, which print like fig. 2, are far more frequent an occurrence than the first example. They, too, can arise from a neglected camera into which fine particles of grit have worked their way and their will upon the surface of the film. Sometimes a slightly



affected negative happens to hold a treasured subject. I have been successful occasionally in removing the "tramlines" from the negative by gentle and patient polishing with a bit of cotton-wool moistened with ordinary liquid *metal-polish*! A Leica film, however, I found to be so thinly coated that only the fainter lines would come away before the whole image became patchily removed. So there was nothing for it but to make enlargements, retouch the lines with pencil, and copy.

LIGHT IN THE WRONG PLACE.

Fig. 3 should not be confused, by "the old hand," with the somewhat similar light-leakage from a wooden slide. This is caused by a corner of an old *metal* dark-slide or film-pack adapter having got worn or the welded seam having sprung. Examine the dark slide or adapter with the suspected corner against a



Fig. 7.

lamp, as in fig. 4. A sprung weld can sometimes be re-soldered, but a hole in the corner can nearly always be cured by inserting

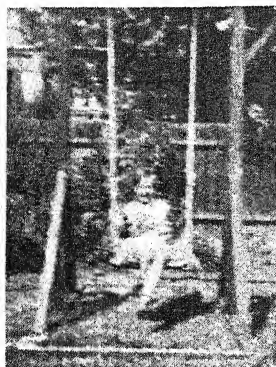


Fig. 8.

a tiny chip or two of "elastic glue" or "Chatterton" (the latter obtainable from electric stores) and then by heating the corner gently (as in fig. 5) till the wax fills the hole and sticks there. If the light ray shows from the *bottom* of the picture, it is worn or flattened velvet that must be suspect.

WEDDING EXCITEMENTS.

Now, who would think fig. 6 was not a similar fault? But it is a wedding snapshot, and people will throw such dollops of confetti and rice!

One does not usually expect ghost effects either at a bridal.

Whoever took fig. 7 did not anticipate a result like this. But he forgot two things. One was to wind his film onwards to the full extent. The other was to look beyond the bride—at the background. This is altogether an unworthy rendering of a subject that should always be handled professionally. The amateur may obtain many pleasing souvenirs of the doings at a wedding, but I maintain that the resources of the professional are needed to do justice to such festive gatherings.

SHAKES AND MOVES.

I have known people to hold wordy competitions regarding the length of exposure they can give while holding the camera in the hand, and to waste much good material in trying their skill. Ability to hold a camera steady for half-a-second or longer may prove temperance or perfect health, but it is rarely a productive achievement. Many quite short snaps are spoiled by shaking the camera during exposure. Jerking the trigger, instead of a gentle squeezing action, is a prevalent cause of "shake," and equally so is the act of breathing, or swaying the body during exposure. The habit of standing firmly, holding the camera to one, and of releasing the shutter so that the pressure of one finger (or thumb) on the trigger is counteracted by that of another, will prevent such blurred results as fig. 8. That it is the camera, and not the swing, which has moved is proved by the whole image being affected.

But this effect should not be confused with that in fig. 9,



Fig. 10.



Fig. 11.

those subjects that only a really high-speed shutter, combined, of course, with a rapid lens and really bright daylight, can deal with. The added difficulty of keeping sharp focus with a large-aperture lens on people who rush about hither and thither definitely puts tennis into the class of "specialist" subjects.

The coincidence of the ball being snapped at its moment of inertia reminds me of my boyhood's attempt to make some fairly close-up whole-plate photographs of field artillery experiments, with a home-made shutter actuated by india-rubber bands! In one of the results a recoiling howitzer and its projectile in full flight were both well defined. I should not care to repeat such an essay now without specially electrically-controlled gear. As I remarked before, however, caution does not always win.

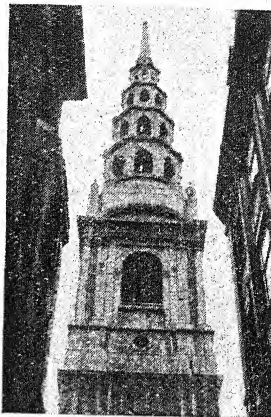


Fig. 13.

in which the slight blurr of the player is far exceeded by that of her racquet, while at the same time the ball is perfectly sharp! Tennis is one of

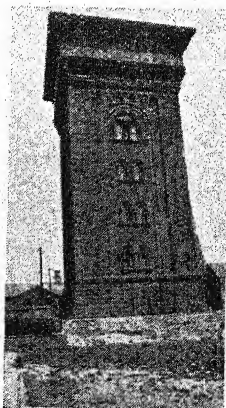


Fig. 12.



Fig. 14.

IMPARTING "INTEREST."

Fig. 10 is a snapshot characteristic of many which are taken as reminiscences of the places visited by the photographer. It looks peaceful enough. If any emotion at all is suggested by this print it is one of utter boredom! The next one (fig. 11) was made only from the next seat along, and the photographer, standing on it, thought he would wait till a few people walked into the scene. But what a difference in attractiveness! It is by no means difficult to cultivate the habit of foreseeing differences like this. The main trouble is that the average view-finder makes the tiny little image look so bright and pretty, that the faculty of observation, to see of what details that image is composed, is temporarily dulled. Keen and constant observation is essential to a good bag of attractive snapshots.

Fig. 12 is a somewhat parallel case. Doubtless the building had some interest for the snapshotter, or he would not have

snapped it. But I feel sure nobody else could possibly evince more than an outward show of politeness when shown this effort. The building is not even perpendicular, and in other respects the photograph is a technically poor rendering of the edifice. If it were too high for a hand-camera to record,

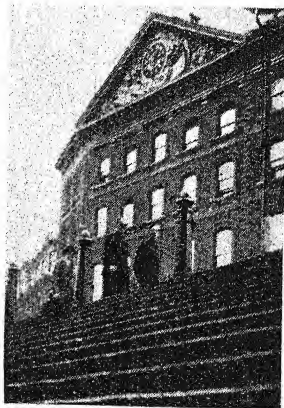


Fig. 15.

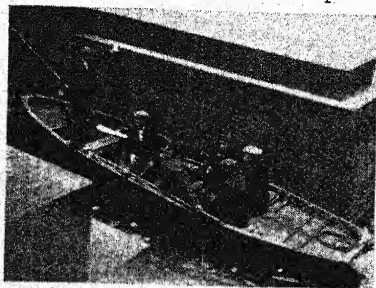


Fig. 16.

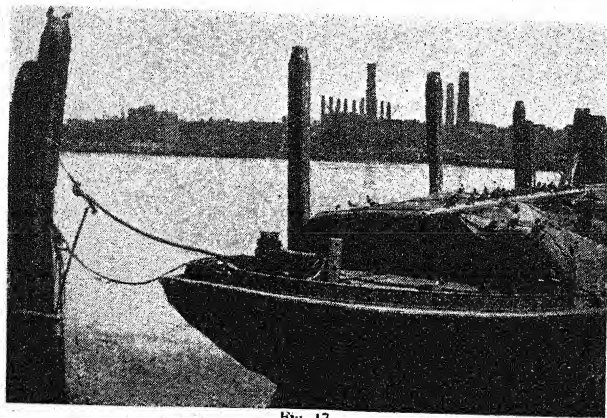


Fig. 17.

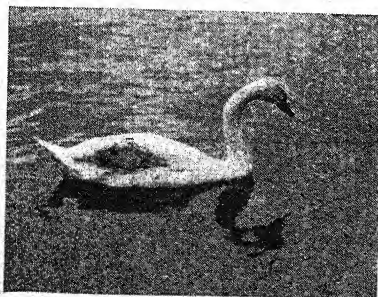


Fig. 18.

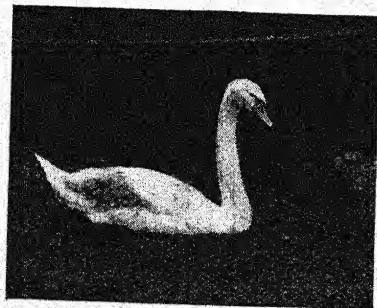


Fig. 19.

with true uprights, it were far better to go the whole hog, as has been done in fig. 13, so as to give an unusual angle to an otherwise severe subject. Notice how the village shop (fig. 14) is given life by the old inhabitant passing by. Cover him with a finger and the picture becomes a mere record. *The Times* building, at Blackfriars (fig. 15) is assisted out of the dully prosaic, first by the lines of the steps in the foreground, next by the photographer having seized on a point and time when the light was reflected from the rows of windows (how flat this print would look if the windows had been dark!) and thirdly, by the passing people. It would have been better

if the photographer had waited for others who might be conversing together, instead of so obviously showing interest in the camera. Just those two blurred faces, looking this way, you will notice, make one think more of the camera than of *The Times* office, which is the subject of the picture !

WHERE ARE THE SUBJECTS ?

Town dwellers are notorious grumblers at the supposed lack of subjects for interesting snapshots. Every town has its own characteristic spots, which are by no means necessarily around the show places of the picture post-cards ! A lunch-time stroll on the Thames Embankment simply teems with picture possibilities of surprising variety, as fig. 16, demonstrates. Bridges and the barges around them offer many opportunities, too, of which fig. 17 is evidence. Those who like to test the speed of their shutters and, at the same time, to secure pictures of flying gulls or pigeons, can do so to their hearts' content around these quarters, if they provide themselves with threepennyworth of corn.

BIRDS AND BACKGROUNDS.

Talking of birds, swans or ducks on water appear to be among the most irresistible of subjects, yet are by no means the easiest. They move more swiftly than their graceful movement suggests, and one needs to work quickly in order to get good close-ups. It is here, as in many other cases, that the reflex camera, with long-focus lens, scores over all others. (Figs. 18 and 19.)

You will perhaps have noticed that these are both of the same bird, but he has been followed from open water to the shadow of a boat. The difference in the types of these two pictures of the same bird is remarkable.

It would be absurd to suggest that one could of set purpose arrange for a bird to pose itself in any desired scheme of surroundings or lighting conditions. It is rather a matter of being alive to opportunities that come to one, and of being quick to take advantage of them.

ABOUT BACKGROUNDS.

There are many kinds of subjects in which the background is under control to an infinitely greater extent than it can possibly be in the foregoing example. Fig. 20 typifies an astoundingly large number of snapshot portraits ! It would have been just as easy to have sat the child elsewhere, or to have removed the deck-chair. Fig. 21 shows how the dark entry of a passage way has been used as an effective background



Fig. 20.

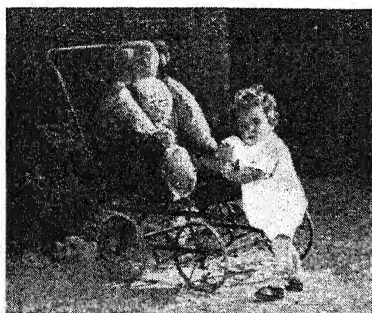


Fig. 21.

several. A good (and a *clean*) lens, and the absence of direct sunlight are desirable conditions. The principal circumstance that governs success is your position on the map! At Brighton, or other south coast towns, you will have the sun in your lens nearly all day, and unless there are plenty of clouds to diffuse it you will certainly be risking disappointment. In any case the face of your subject is likely to come out dark.

for the sun-tipped hair of a child. It is an extremely good plan, when wishing to photograph a child of this age, to arrange something in suitable circumstances that he or she will run to.

To follow a lively child around with a camera is often a process that uses up films and exhausts patience with the minimum of results.

AGAINST THE SKY.

All elementary teaching forbids using the sky as a background, yet here (fig. 22) is one of many entirely successful results. What is the secret of this? There are



Fig. 22.



Fig. 23.

HOLIDAY RECORDS.

There is certainly not much purpose served by depicting the sad way (fig. 23) in which Britishers are reputed to "enjoy" themselves. There is much more appreciation to be gained from snapshots which exhibit some *joie-de-vivre*, as is easily proved by looking at fig. 24 and comparing it with the previous one!



Fig. 24.

THE HOUSE WE STAYED IN.

Which reminds me that hardly a holiday batch of films fails to include at least one of "house we stayed in" (with or without landlady of ample dimensions). How much better than fig. 25 (which few will more than barely glance at) is a view which shows the house in a setting characteristic of the country in which it stands? Figs. 26 and 27 include the house depicted in fig. 25, and are two of half-a-dozen entirely differing

pictures taken during the half-hour before tea. They were made, by the way, with a very slow shutter speed, with the lens stopped right down to $f/32$, which to my mind results in crisp negatives which produce enlargements of a kind that is very widely appreciated.

SNAPSHOT PORTRAITS.

When one has been taking views, it is very easy to forget to make the necessary adjustment, according to the



Fig. 25.

type of camera, for close-ups.

To omit this results in the effect shown in fig. 28, in which the distant trees are sharp, proving how the failure arose. Another familiar error arises from the fact that mothers often try to *make* their babies smile, and will even hold them up to have them portrayed in a sitting position before their age warrants it. In fig. 29 the child's expression is the natural result of such efforts on the mother's part, and her arm is not a detail that adds beauty to the picture. It is far more conducive to success to *let* the baby be really happy, as in fig. 30, than to try compulsion!

SAME WITH ANIMALS.

Unless the purpose of the



Fig. 26.

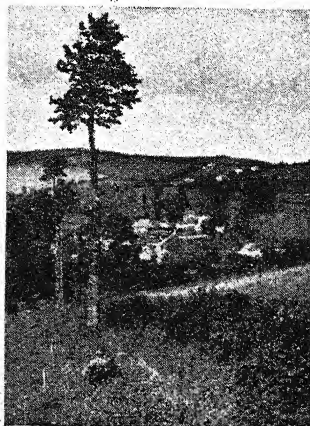


Fig. 27.



Fig. 28.

photograph is to sell the animal, in which case he is required to assume some approach to a specific outline, a lead of any kind is quite foreign to the making of a spontaneous picture. A dog-lover may appreciate the points of the well-posed animal, but, a snapshot has not an iota of the popular appeal of one showing the dog all on the alert on his own affairs.



Fig. 29.



Fig. 30.

a rapid lens, or in the brightest summer months. Winter has its own fascinating opportunities (which are all too often missed), but "moonlight" photography, whether the genuine night-view, or effects simulated by the setting sun, is not for the winter, unless real snow and ice, or other large white areas, form the subject. Even then time exposures and fairly long ones are the rule, which is outside the scope of "better snapshots."

EVENING SNAPSHOTS.

Much film is spoiled by taking chances when the evening light grows weak. Poor light seldom gives good snapshots. Even with the fastest lenses they can often look disappointingly flat and grey, especially in the case of sunsets, whose beauty lies in the colour scheme far more than in the pattern. Only when the setting sun plays on water does the waning day offer real snap-shotting possibilities, of the kind shown in fig. 31. These so-called "moonlight" effects can be very beautiful indeed, but require to be made either with

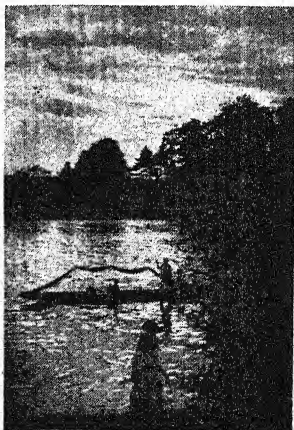


Fig. 31.

CINE PICTURES AT NIGHT

By JOHN H. AHERN.

Such notable advances have been made in the manufacture of photographic lamps, lenses and emulsions during the last decade that it can now be said that cinematography is possible, within reasonable limits, in any house where tolerably efficient electric wiring is installed. Special incandescent bulbs with a high emission towards the violet end of the spectrum are available at reasonable prices; many 16-mm. cameras can be obtained equipped with lenses working at $f/1.9$ or even $f/1.5$, which, in the short foci used for amateur cinematography, admit of sufficient depth of focus for most purposes.

It is, perhaps, in the manufacture of emulsions of abnormal speed and sensitivity, however, that the most remarkable advances have been made, so much so that under the most favourable conditions cinematography is now within the margin of the possible by ordinary room lighting, without any special equipment at all.

LAMPS.

Distinct from the lighting equipment used in ordinary photographic and cinema studios, a number of lamps have been produced by various manufacturers more or less specially to meet the requirements of the home cinematographer. These are usually characterised by lightness and portability; many being designed to fold up into the space occupied by a suitcase when not in use.

Most of them are designed to provide a very powerful and concentrated light over a comparatively limited area, and are, therefore, very suitable for the illumination of one or two figures such as are most likely to be attempted by the amateur in his initial efforts. Prominent amongst lamps of this type is the Kodalite, now produced in several models by Kodak, Ltd. It is designed to employ a 500-watt projector-type bulb. It is supplied complete with a telescopic metal tripod stand, which folds up when not required. Portable lamps are also supplied by Zeiss Ikon, Ltd., and by Korting and Mathiesen,

Ltd., designed, primarily, for bulbs of the "Nitrophot" high-efficiency type, although ordinary half-watt gas-filled bulbs will fit them if preferred. The current consumption is such that it is usually possible to work at least three such lamps on the ordinary domestic wiring, although I strongly advise that in all cases the advice of an electrical expert should be sought as to the capacity of the wiring and the best way to distribute the load.

O. Sichel & Co. (1927), Ltd., Peeling & Van Neck, Ltd., and Soho, Ltd., have some excellent portable arc lamps embodying one, two or three pairs of carbons, usually of the parallel type. These lamps demand little attention and may be handled almost as easily as incandescent bulbs. They give a very intense light of a bluish colour, rich in violet and therefore highly actinic.

Whilst it is possible for anybody equipped with two or three of the lamps mentioned in the preceding paragraphs, and a lens working at $f/2.8$ or $f/1.9$ to secure results of a sort, it is the purpose of the following notes to endeavour to show the home worker how to obtain the maximum of pleasure and profit from the resources at his disposal.

LIGHTING AND EXPOSURE.

The amateur with limited resources is well advised to consider his lighting under two heads: "general" lighting for the first, and what I propose to call "accent" lighting for the second. General lighting is the most difficult to provide in an efficient manner, and it should be considered first, as it forms the basis of your future activities. And it is necessary to make clear what I mean by general lighting. It implies a diffused "all-overish" light which illuminates the whole of the subject more or less evenly and *casts no clearly defined shadows* which means that it must come from a more or less diffused source, the more diffused the better usually.

For this general light two, three or more high-power lamps may be used, suitably diffused with muslin, or the ideal of a shadowless light may be more nearly approached by using a larger number of smaller bulbs, say of 60 or 100 watts, mounted up into a "bank." An excellent lamp on this principle is on the market known as the Kettle Shadowless Lighting Unit. In this lamp the bulbs are mounted in a large, almost flat, polished metal reflector, made slightly concave behind each bulb. It is obtainable either for suspension from the ceiling or a beam or mounted on a metal stand on runners. A similar, though less efficient, unit can be made at home by obtaining a large sheet of polished tin or aluminium and drilling

holes to fit ordinary bayonet sockets spaced out at intervals of about 10 ins. or a foot. The sockets are then pushed through the holes and held in place by means of their locking rings; the wiring can be looped out from lamp to lamp at the back. This unit can be mounted into a light frame of say, 1 in. \times 2 ins. wood, and arranged to move about on rubber tyred wheels or castors. The carpentry involved is of the simplest description but it is necessary to see that the lamp is not top-heavy.

It should be understood that the purpose of the general light is usually to provide a basis on which a satisfactory lighting may be built up, usually by the addition of one or more lamps giving a more concentrated light. The general light should not, as a rule, be used by itself or the results will be rather flat and uninteresting, and lacking in the sensation of roundness and depth. If sufficient current is available the general light may be obtained by turning several lamps away from the subject on to light reflectors and allowing only the reflected light to reach the set. The walls and ceiling may serve as reflectors if light in colour. It is unlikely, however, that the home worker will have sufficient light available to use this method as it is necessarily wasteful. If a certain amount of reflection from the ceiling can be arranged, however, it is all to the good, as most amateur films suffer from insufficient top lighting.

It is not easy to give definite figures as to exposure, since so many factors are involved in each individual case, apart from the obvious considerations of power and distance of lights, speed of film, etc. The size of the room and the colour of the walls and other surrounding objects are factors which exercise an important influence on the question of the stop to use. At certain times of the day the supply mains may operate slightly above or below the normal voltage, and such variations can affect the power of half-watt incandescent lamps very seriously. The best I can do is to give one or two cases from personal experience where satisfactory results were obtained, and hope that the reader may find them useful as a starting point for further work.

One Kodalite, with the diffuser supplied by the makers, was placed 5 ft. from a half-length subject and film was exposed at $f/1.9$. The result was sufficiently exposed although of necessity a little heavy in the shadows, owing to the absence of an efficient reflector. This was with the old Kodak Orthochromatic cine-film.

One Satrap single-point 5-amp hand arc was found to give adequate exposure at the same distance and with the same

stop and emulsion. When the lamp was removed to 9 ft. the illumination dropped to such an extent that the density in the darker parts, *i.e.*, the coat and hair, was not sufficient to give printable detail.

With two undiffused Kodalites, one at 6 ft. at the side of the subject, and the other at 10 ft. in front, it was found that the lens could be closed down to $f/3.5$. In this case Kodak ordinary speed panchromatic film was used. For Super-Speed panchromatic film a stop one marking smaller than that used for the ordinary pan film would be correct.

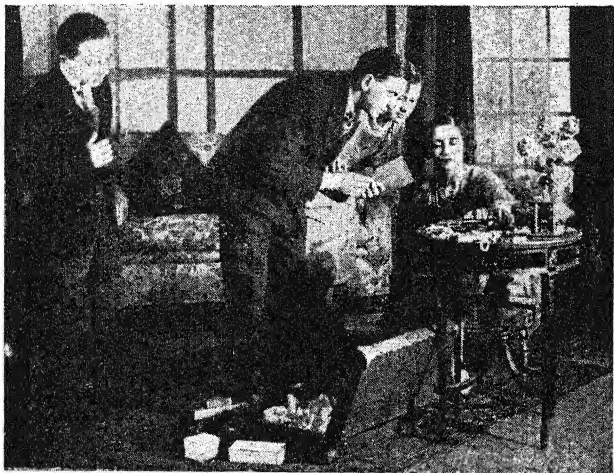
If ordinary half-watt bulbs are used it is all but impossible to give any exposure figures without knowing something of the nature of the reflectors used with them. I venture to suggest that, to start with, a 1,000-watt bulb of this kind should be treated as equal to a 500-watt Kodalite or a 500-watt Nitrophot. This is a very rough approximation; it is only intended as a guide for a first trial.

THE PROBLEM OF STUDIO LIGHTING.

But to arrive at a reasonable balance between the power of the lamps and the stop and emulsion used in the camera is only the first step towards the successful lighting of a cine film, as I will now explain.

The placing of the lights in a small low-power studio must always be something of a compromise, and to explain why, I must recapitulate what is known as the law of inverse squares, which is this: the intensity of the light diminishes in inverse ratio to the distance of the light-source from the subject. This, as a matter of fact, is only strictly true for a *point* light-source, but it is near enough for us to go on with. Supposing that a lamp is placed one yard from a subject and an exposure of one second is found to be necessary (I am writing in terms of a still camera because it makes it easier to follow), then if the lamp is removed to a distance of two yards an exposure of *four* seconds will be required, and at *three* yards *nine* seconds will be required. There is no need to go further into technicalities, but I do want you to understand where it is going to trip you up in cine work.

You will see the difficulty of knowing just how far the light should be from the subject in any particular case. If you place them well back, away from the subject, you suffer a serious diminution of efficiency more than you may be able to afford. If you place them closer, you may be troubled with unequal illumination of different parts of the subject leading to forced and unnatural effects. I think this is the most common fault in amateur lighting. Suppose a standing figure



A good example of simple 45° lighting as planned in fig. 2.



A "firelight" effect from the film "Extinction."

is lit by a single lamp, about 7 ft. from the ground, placed so that the lamp is about 3 ft. from the sitter's head, then you see that the distance of the lamp from the sitter's feet will be over two yards, and by the above rule the feet will receive less than one-fourth as much light as the head. Obviously you cannot give an exposure which will be "correct" for both. All you can do is to endeavour to even up the light by every available means.

If it should happen, by reason of lack of space, or from inadequate lighting facilities, that it should be impossible to arrive at a reasonably even lighting with the lamps which are being used to light the set, it only remains to correct matters as much as possible by pressing into service any old lamps which may be available, such as table and bed lamps and, in fact, anything which can be moved about on a length of flex and used to "fill up" awkward shadows. Reflectors may be used for the same purpose. It may help to cover the floor between the set and the camera with a sheet, or with newspapers. It is assumed that the lens is fitted with a reasonably efficient hood. If possible the reflector should be raised a foot or two off the floor at the end nearest to the camera, so as to direct the light towards the subject and away from the lens. Do not fear that you will get too much bottom light; you are very unlikely to do so.

A blue or yellow monochromatic glass is very useful for judging if a lighting scheme is properly balanced. Remember that one of your greatest troubles is the under-illuminated patch which is going to drop into the region of under-exposure if overlooked. It may not be very noticeable to the eye, because our eyes can comprehend a much wider range of luminosities than any photographic emulsion, but it will just look odd and nasty on the film. You must train yourself to be on the watch for such uneven lighting, and in time it will become almost second nature.

ACCENT LIGHTING.

To turn now to what I have called "accent" lighting. By this I mean a localised lighting which, it will be found, serves the amateur cinematographer most effectively for a large proportion of the compositions which he makes at home. Accent lighting does not necessarily imply the use of a "spot light," so called, but it can be taken as a general rule that the light used to obtain modelling will be harder, that is to say, will throw more definite shadows than the general light. For example, naked bulbs may be used when the general light is

diffused. A spotlight is very useful, but it must be applied with taste and discrimination ; and it must be remembered that few people can stand a focussed spotlight directed straight into their eyes.

The "accent" lighting may be placed in any position you like in relation to the subject, so long as it fulfils its main function of giving relief and modelling : it may be in front, or at the side or behind or up above.

Don't allow some preconceived idea about back lighting as used in the American studios to run away with you and blind you to the almost infinite range of possibilities. Many profitable evenings can be spent simply trying out different lighting combinations with the help of a sympathetic and patient model, and a lot can be learnt even without the expenditure of film, although it is naturally better to run off a foot or two on each fresh arrangement.



Strong dramatic lighting obtained as shown in fig. 5.

The relative strengths of the "general" and the "accent" lighting provide one of the most powerful devices in the hands of the director for establishing the mood and "atmosphere" of the picture. Speaking generally, as the "accent" lighting, usually understood to suggest side or back lighting in this connection, is increased in intensity, and the general lighting is diminished, the mood of the picture will approach nearer to "dramatic" and "mystery" effect. This simple device may be regarded as the first step in the dramatic control of light. The relative intensities of the lights may be varied within limits by moving them nearer to or further away from the subject and here, again, is a profitable field for experiment.

Figs. 1 to 5 will help to clarify the foregoing. The first shows the simplest form of general frontal lighting alone ; it is assumed in this and in the following diagram that the

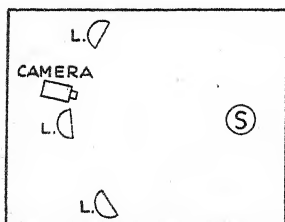


Fig. 1.

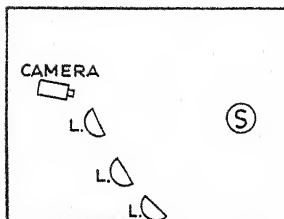


Fig. 2.

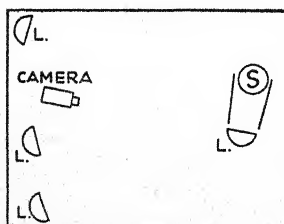


Fig. 3.

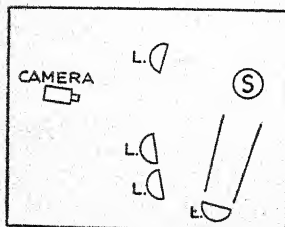


Fig. 4.

general lights are sufficiently diffused to give a more or less shadowless light. The results with an arrangement such as that shown in fig. 1 would be very flat and uninteresting. In fig. 2 the same lamps are used at the same distance, but they have been shifted round to one side to produce a 45 degree front lighting. For many simple domestic scenes a lighting of this kind is perfectly satisfactory by itself, and it is the one which the beginner should try first. Fig. 3 is similar to fig. 1, except that a flood or spot has been introduced at the side of the subject. It will be found that the picture gains in relief and boldness at once. A number of experiments should be made, placing the lamp at the side at various distances from the subject and moving it nearer to the camera and nearer to the back of the subject, and the effect noted each time.

Now make a comparison of figs. 4 and 5. The same lamps are used, and their directions are the same, but their relative distances from the subject are very different. In effect, fig. 5 shows an elementary form of "dramatic" or "mystery" lighting. The frontal lighting has been much reduced by moving the lamps as far back as possible, and a strong back light is used; the figure will be very dark and sombre and brilliantly outlined wherever the back light happens to strike, notably down the left side. Limitations of space prevent me

from going further into the fascinating aspects of the subject which I have touched on above. I can do little more here than indicate the first steps, but I hope I have said enough to stimulate the taste for this sort of work. By experiment and practice the amateur can in time learn to produce any lighting effect that may be required at will.

In concluding this section I should like to say a word about the lighting of backgrounds. The background or "scene" is usually further away from the lamps than the actors and is, therefore, liable to receive less than its fair share of light. This point should not be overlooked and when possible it is well to let the background have one or two lamps to itself.

LAMPS FOR SPECIAL EFFECTS.

For trick lighting effects it is sometimes necessary to provide special lamps, and I will describe one or two which are well within the resources of the home worker.

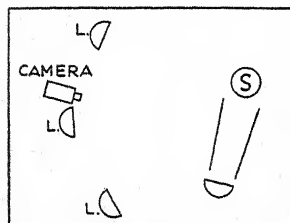


Fig. 5.

A scene which is often required is that of a person seated at some occupation such as reading or writing, illuminated by the light of a reading lamp. All that is necessary is that the lamp should be provided with a cheap parchment shade

from which a section of the parchment has been cut away on the side facing towards the sitter, and which, of necessity, must also be the side which is turned away from the camera. Unless the parchment is very opaque it may be found necessary to back up the shade on the side which faces the camera with an extra thickness of paper to prevent the lamp from appearing too bright. A 200-watt bulb in the lamp if within about 3 ft. of the subject in combination with some, but not too much, general lighting, should give some very interesting results.

Several years ago the writer made a film which some readers may remember under the title of "Extinction," wherein it was necessary in certain scenes for a character to be seen moving about carrying a lighted candle. Actual candle light would, of course, have been useless. The effect was obtained in the following manner: a metal candlestick, with a large, rather florid base, was obtained; the insulated unit carrying the carbons and terminals was removed from a Satrap hand



Fig. 6. A property candle which conceals an arc lamp.

vice, one of them being shown in fig. 6.

The first duty of anybody making a lamp of this kind is to see that the carbons and wires are properly insulated from the metal base of the lamp, and that the flex used is of good quality and free from breaks in the wires or patches of defective insulation. If it can be arranged for the handle by which the lamp is held to be insulated as an additional precaution, so much the better.

On page 159 is shown an effective "firelight" scene from the same film. The big old-fashioned fireplace is a property one, built of cardboard on a light wood framework, and the light is provided by two Kodalites removed from their stands and placed on the floor in the space where the fire is supposed to be.

CINEMATOGRAPHY IN THE THEATRE.

Stage scenes necessarily vary enormously in luminosity and actinic value, but many are quite sufficiently well lit to admit of ciné work from suitable seats in the auditorium.

The fastest panchromatic film should be used in conjunction with a lens working at $f/1.9$ or $f/1.5$. A seat at the side of the house or in a box will probably give more interesting results than one in the centre. A serious difficulty is present when powerful arc spotlights are used to pick out single figures,

arc lamp and mounted in the base of the candlestick, so that the carbons were in a vertical position. The flex came out through the base of the candlestick, near the handle, and was carried away inside the sleeve of the coat and allowed to trail on the ground. All the actor had to do was to carry the candlestick in such a position that the carbons were constantly concealed from the camera behind the actual candle, which appeared to be responsible for the light. Some very striking and realistic effects were obtained with this de-

as such figures are probably illuminated out of all proportion to the rest of the stage and will be quite seriously over-exposed with a stop which is correct for other parts of the scene. If the figure in the spotlight, being a leading player, is deemed to be of greater importance than anything else, then it will probably be necessary to stop the lens down to $f/3.5$ or even less, according to the strength and colour of the spot. It is



Another candle effect similar to fig. 6.

very necessary to take the colour of the light into account—amber or reddish lighting necessarily has very little actinic value, although it may appear bright to the eye. Mixed colour effects are very difficult to render properly, as portions of the stage where amber or red predominates will almost certainly be under-exposed, even if they make any impression on the film at all.

NIGHT WORK OUT OF DOORS.

By this I mean photography of street scenes and the like in cities after dark. Naked lights such as motor head-lamps and street lamps, should be kept out of the picture as much as possible. A time immediately after rain should be selected if possible, as the reflections from the wet road will assist materially. Very striking effects can be obtained, but sufficient exposure to give a result cor-



From a frame of 16 mm. film taken on a dry evening.

responding to the effect as seen by the human eye is hardly to be expected. Many shop windows, however, are sufficiently well lit to give practically full exposure, but figures moving in front of the window will necessarily appear in silhouette. Floodlit buildings will give very striking results if the flood lighting is sufficiently general. If it is desired to take a scene of two or three figures in the open air at night, a pair of powerful motor car head-lamps should provide sufficient illumination, provided the fastest panchromatic film and a lens not smaller than $f/1.9$ be used, and that the actors keep as close to the front of the car as possible.

For electric signs a lens working at $f/3.5$ is quite fast enough, except for red Neon signs, which it is almost impossible to render under any circumstances.

MODERN MINIATURE CAMERAS.

By WILLIAM ALEXANDER.

Although good photography in general is independent of the type, date, style, size or weight of the apparatus employed, it is nevertheless a fact, insufficiently recognised even by many practised workers, that photography with the modern precision small instruments has certain peculiarities and many outstanding advantages which should be much more widely known.

The modern miniature camera has come to stay; so far only the fringe of its possibilities has been touched, and it behoves the progressive photographer (beginner, old hand, amateur and professional) to learn its applications and familiarise himself with its outstanding features.

To the photographer who gives it just a passing thought the miniature camera is merely a small edition of its larger and older brothers, simply a light, portable and everyday instrument, justifying its existence only by virtue of these qualities, with, perhaps, the additional advantage of low running cost and availability at times when the larger models would be too bulky or heavy to carry about.

These advantages are too well known to need emphasising; but quite apart, there are many others of much greater importance, particularly to the serious photographer.

EXPOSURES BY THE SCORE.

The first outstanding feature is, of course, that one small roll of film provides the user with an ample number of exposures. The number of exposures available in the one spool of film varies with the particular type, the minimum being 12 in the small Rolleiflex. Cameras giving a negative 4×3 cm. allow 16, while the Leica, Contax and Krauss-Peggy cameras give as many as 36 on the one spool of film.

The great advantage of these large numbers of exposures without reloading has a far wider significance than in holiday and touring photography, which advantage is the one usually and solely stressed by the makers.

The facility of making, in rapid succession 12, 16 or even 36 exposures is very valuable when dealing with subjects in Zoo photography, animal portraiture in general, and baby

photography, where, as every photographer knows from bitter experience, only few exposures result in satisfactory negatives owing to the rapid and unexpected movement of such subjects, and the remarkably sudden manner in which a good pose or expression changes to an unsatisfactory one. Added to this is the further advantage of the small cost of making a large number of exposures in order to secure a few really good ones.

SPEED AND FOCUS.

The next important feature is the optical advantage. It is possible to fit a miniature camera with a lens of very great relative aperture, greater even than $f/2$, and apart from the fact that such an aperture could not be used in most circumstances, with longer focus lenses as used in the bigger cameras, no camera of, say, quarter-plate folding pocket type could carry an $f/2$ lens owing to the latter's vast size and weight.

The optical advantage of the miniature camera arises in this: the negative being very small, a relatively short focus lens is perfectly satisfactory. Miniature cameras are ordinarily fitted with lenses of 5 or 6 cm. focal length. From this it is easily seen that even $f/2$ means a lens of no more than about 1 in. diameter.

It is now common knowledge that if a lens is of actual as well as relative short focal length, it confers a great increase in the depth of field as compared with a longer focus lens for any given stop. Slight errors in setting the focussing scale are compensated, and furthermore, there is a much more satisfactory quality in an enlargement which depicts all the different planes of the subject with some semblance of reality rather than the strange blobs and blurs so commonly seen in photographs made with larger cameras having lenses of two or three times the focal length.

TYPES OF CAMERA.

The third, and in my opinion the most far-reaching, advantage of the miniature camera is that with the higher-priced precision types the modern photographer can tackle successfully an amazingly wide range of unusual and difficult subjects such as would be quite impracticable with the larger cameras. We will discuss this aspect more fully later; here we will briefly review some of the leading types as a help in choosing.

Modern miniature cameras may be conveniently grouped under four headings.

(1) *The Simple Type*.—These cameras cost from about £3 10s. to £6 or £7. They are practically small representatives in appearance and manipulation of the type familiar to photographers these last few decades, being folding or collapsible

roll-film instruments, focussing by rotating lens mount or collar from infinity to 4 or 5 ft. The lens fitted is usually an anastigmat of $f/4.5$ aperture and according to price, the shutter gives time, brief time and $1/25$ th, $1/50$ th, $1/100$ th second; or, in the Compur, a full range of speeds from 1 second to $1/300$ th. The view finder fitted is an eye-level, direct-vision frame one, and the little camera takes the standard vest pocket size film, but allows 16 exposures to the roll by the provision of two red sighting windows, through the lower one of which the number on the film backing paper is first adjusted. Then, for the next exposure, the winding key or milled button is turned until the same numeral appears again through the upper red window, thus giving two negatives, each $1\frac{1}{2} \times 1\frac{1}{4}$ ins. on the regular V.P., or $2\frac{1}{2} \times 1\frac{3}{8}$ ins. section of film.

These simple models are in every way well made and carefully adjusted, and will be found highly satisfactory for all-round snapshotting, holiday records, rambling and groups, and will give a good account of themselves for near portrait snapshots. In short, these models can be employed for all purposes where the larger roll film cameras would otherwise be used.

A few examples of this type are the Zeiss-Ikon Baby Ikonta, the Nagel 48 Volenda, and the Dolly.

(2) *High-grade Large-aperture Models.*—These cameras are an advance on the foregoing, being of finer finish in general and equipped with such refinements as depth of focus scales, distance meters; and carrying lenses of aperture ranging from $f/3.5$ to $f/2$, all mounted in Compur shutters and furnished with very accurate optical direct-vision view-finders, showing a reduced facsimile image of that falling on the film.

Owing to their perfect precision, exquisitely defining anastigmat lenses and the full range of high-efficiency speeds of the shutter these fine-grade miniature cameras have become very popular and are widely used by all classes of serious photographers, including professionals, pressmen, medical men, travellers, explorers and pictorial photographers.

These superior models, ranging in price from about £10 to £20, also take the regular V.P. film and give 16 exposures to the roll. A number of very useful accessories are available for these cameras. There are distance meters, lens hoods, yellow filters and Proxar lenses to be had for use in conjunction with them, all perfectly adapted, and the photographer who starts out with one of the high-grade types can add whatever of these accessories he considers will extend the scope of the instrument, and can, in fact, gather a complete photographic outfit which he can pack away in a small case and carry about with ease in his pockets.

Among the leading models of this type are the Zeiss-Ikon Kolibri, the higher-priced 48 Volenda, the Nagel Rolloroy, and the Mentor Three-Four.

(3) *Miniature Reflex Camera*.—It is generally conceded by all experienced and leading photographers who follow the art seriously that for such exacting work as "close-up" portraits, pictorial landscapes and the photographing of small bits on a large scale there is no type of hand camera so productive of certain and good results as the reflex camera.

Unfortunately, most photographers of the present day object to the bulk, weight and running costs of the old-style focal-plane shutter reflex camera.

The advent of the new miniature reflexes, radically different in nearly every feature, has removed these objections, and the one or two models of miniature reflex cameras now available at very reasonable prices, considering their wide range of usefulness, should find a warm welcome among those who want a de-luxe camera of the best all-round kind.

The miniature reflex is a twin-lens camera having two lenses of identical focal length and critical defining power. The viewing lens projects an image on to the top focussing screen, while the taking lens, when the shutter is operated, projects an identical image on to the film. Because of the actual small size of these reflex cameras, the lenses can be set so closely to each other that even when a very near object, such as a "close-up" head and shoulder portrait, a group of flowers or a small inscription is being photographed, the two images are practically identical. In the old-fashioned twin-lens cameras which preceded the focal-plane shutter reflex, and which became obsolete before most of us were born, the smallest size was quarter-plate, and the dimensions of the camera were prodigious. The lenses were set so far apart, of necessity, that there was a serious discrepancy between the two images when near objects were attempted.

The taking lens of the new miniature reflex cameras is mounted in that best of shutters, the Compur, and as the viewing image remains on the screen for inspection before, during and after the exposure is made, it will at once be realised how certain the photographer can be that he is getting exactly what he wants.

In actual use the photographer has not only a full negative-size view-finder, showing a perfect facsimile with all its facilities for composition and careful placing of the subject; he has also the means of critically focussing any desired object or plane; and additionally, there is, on the hood, a powerful magnifier, which is a further help to this end.

The two models available in miniature reflexes also employ the V.P. film. In the Small Rolleiflex the negative is square, $1\frac{5}{8} \times 1\frac{5}{8}$ ins., and the roll of film is made to give 12 square pictures by means of an automatic dial and counter operated by a half-turn of a small winding handle. In the Pilot reflex, the more usual $16 \frac{1}{8} \times 1\frac{1}{4}$ ins. pictures are secured, also by means of a small handle, operated by two pressures for each change of film section and also recording the number of the exposure on a small dial.

A full range of accessories similar to those mentioned in the description of the non-reflex models is also available for these small reflex cameras.

(4) *Leica and Contax*.—The unique and world-famous Leica was the first really precision miniature to make its appearance. It does not employ the more familiar V.P. film, but uses a specially spooled strip of perforated cinematograph film, standard 35 mm. size, but giving a negative twice the size of the standard cinematograph frame. The film is available in all the best and leading makes, and additionally in several kinds not ordinarily available for other cameras. Each roll of film allows of 36 exposures. The Leica can therefore be carried in the pocket with a sufficiency of negative material ample for a long week-end of photography, a day's work at the Zoo, or several series of baby portraits, without re-loading.

These and the following remarks apply equally to the Zeiss-Ikon Contax camera.

The shutter of the Leica is a simple focal-plane one with a full range of useful speeds, and the setting of the shutter for exposure at the same time changes the film, thus positively eliminating double exposure on one section of film.

The adoption of the focal-plane shutter, which is as simple in operation as the Compur, leads to a very valuable application of the Leica camera. It allows the rapid interchange of a battery of lenses of different apertures and focal lengths.

While the lenses fitted to the types of miniature cameras reviewed previously are a fixture and cannot be removed in order to substitute one of longer or shorter focal length, it will be generally found that for most purposes a lens of 5 or 6 cm. focus is quite adequate and satisfactory. On the other hand, it is sometimes very convenient and useful, and occasionally valuable and important, to be able to use on a miniature camera a wide-angle lens, an ultra-rapid portrait lens of long focus, or a fixed-separation telephoto lens for mountain scenery, sports pictures and press work. It is in these respects that the Leica camera and its accessories offer something out

of the ordinary to those who can usefully and profitably employ them. A noteworthy point about the Leica lenses is that each one is set in a focussing mount that couples up with a range finder permanently mounted on the camera. Whatever lens is being used, as the focussing mount is adjusted the image in the range-finder ensures a perfectly sharp image on the film as soon as it is seen to be correctly focussed in the range-finder. This feature gives the exactitude of focus of the reflex camera but not, of course, the full size image as in the reflex type of camera.

THE SCOPE OF SUBJECTS.

In all photography, providing the camera is in order and its limitations known, the perfection of results is largely in the hands of the user. The most costly models can always be used as simply as the cheaper ones when the extra facilities are not in demand. It is, therefore, a good investment to buy the best one can manage, so as to be equipped for more advanced and difficult work when need arises, and circumstances indicate such additional facilities.

In the making of general and everyday photographs at home and in familiar surroundings any of the miniature cameras described is, of course, perfectly suitable. The rapid lenses fitted even to the cheapest models, the ultra-rapid, high-quality and fine-grain colour-sensitive films available for them ensure that a pleasingly large percentage of exposures will be successful, especially after a little experience and practice with the camera in order to ensure familiarity with its working points.

Street scenes, family groups, a pictorial record of a ramble, all come easily to the user of a miniature camera, and beyond a careful reading of the instruction leaflet, the veriest beginner has little reason to worry about failures. There is one point, however, which should be emphasised. Usually the photographer will want enlargements of a fairly moderate size—post card or half-plate—from most of his small negatives. In order to secure a sharp, crisp enlargement, the original negative must be itself needle sharp and free from fog. The lenses fitted to all miniature cameras will give critically sharp negatives but the user of the camera must help in this matter by holding the camera perfectly steady when making the exposure. Since these miniature cameras are fitted with eye-level view-finders and are small and light in weight, it needs a little practice and great care all the time to hold them quite steadily. The point of the finger should rest on the shutter release which should be very gently depressed.

To ensure fog-free negatives it is particularly important to load the camera in as shady a spot as possible, to take great care not to let the film partially unroll while loading, and to take the same care when unloading the exposed film.

If the user elects to do his own developing of the films he should bear in mind that the type of negative giving the best enlargement is one that is not developed too far. It is undoubtedly advisable to use a developing machine in conjunction with a thermometer and clock; and for the general run of exposures to ascertain the time and temperature correct for normal contrast negatives of normal contrast subjects. This period should not be exceeded; if anything, a little less time is better.

FOR HOLIDAYS AND TOURS.

It is when we contemplate in advance our photographic activities during the annual holiday away from home, perhaps in strange countries, that serious consideration will be given to our equipment and its possibilities, that is unless we are content with ordinary mediocre results. The miniature outfit enables us to take with us a complete outfit, with all valuable accessories likely to be needed, in quite a compact parcel.

Since our purpose may well be to secure an important record of the people and customs of the locality, or an extensive set of pictures for illustrating a book, or a set of lantern slides, our equipment must be complete, the instrument fool-proof, and our working methods deliberate and painstaking.

As fulfilling the needs in apparatus, I have found one or other of the higher grade miniature models entirely satisfactory.

Experience confirms the incomparable value of such a camera, particularly when fitted with a lens of about $f/2.7$ or $f/2.8$ speed. When it is realised that $f/2.8$ is eight times nominally as rapid as $f/8$; that even when used fully open the critical definition is astonishing and the depth of focus great, it will be seen what a power we have for the making of good negatives under the most adverse of conditions.

The writer has made "close-up" head-and-shoulder portraits indoors at 6 o'clock in the afternoon, on a not very bright April day at $1/10$ th and $1/25$ th second with the camera held in the hands. Half-plate enlargements from the little negatives look like studio portraits in quality taken direct with a half-plate camera.

With a miniature camera and 2-in. focus $f/2.8$ lens, snapshots of very dark near objects are successful even near sunset. The Compur shutter may be set at $1/300$ th second, and gives

fully timed exposures of rapid-action subjects such as ski-ing, sleighing, football, etc., even with a light-filter over the lens.

The mention of light-filters is a reminder that no miniature camera can be considered complete for a tour unless accompanied by one or two light-filters, a lens hood, and a Proxar lens for copying, in good size, inscriptions, small "bits" and "close-up" portraits of interesting natives. An exposure meter of the extinction type is also a very valuable adjunct.

Every photographer of some experience has his own pet films. All the modern ones are very good, but they differ in such details as contrast-giving qualities and development times, and in their colour-sensitivity range.

The writer finds Verichrome his favourite for outdoor work in the brighter months of the year, while the Agfa Iso speed film seems to give rather more vigorous negatives in winter time, and it has, moreover, a shorter development time, an advantage in cold weather where development needs prolonging owing to the lesser activity of the developer at the lower temperature prevailing.

WHAT THE USER MUST DO.

In using the miniature camera abroad for important and probably unrepeatable photographs, the greatest forethought and care should be given to holding the camera rock steady. Before re-loading, remove all dust and hairs from the interior of the camera with a soft clean brush carried for the purpose, or inevitably a speck will settle on the film over some important person's eye or in the detail of a cloud. If the Leica, Contax or Rolleiflex camera is being used there will be no difficulty or doubt in establishing critically sharp focus. With the other type of camera with eye-level finder, a range-finder, attached or separately, is worth the little extra trouble of using. Nor should one overlook the value of the depth of focus scale or table which forms part of many of the miniature cameras.

Amplifying the remarks on securing fog-free negatives, it is a little known but very valuable fact that even under very trying conditions, against the light, or where water and bright sky comprise most of the picture area, if a light-filter is used on the lens it prevents halation and radiation and the effects of general light-scatter. The addition of a lens hood ensures beautifully clean negatives, ideal for enlarging.

The modern roll-film is so fast and colour-sensitive that a light-tint filter entails very little increase in exposure. As a matter of fact, the anastigmat lenses fitted to the miniature cameras, owing to their thin glasses and their actual nearness to the film surface, are in practice twice or even more than

twice as rapid as their nominal apertures would indicate. It is, therefore, perfectly correct to assume that with a $2 \times$ filter the normal exposure which would be given when using a larger camera without a filter on the lens can safely be given *with* a filter when a miniature camera is in use. Here is another advantage of the latter.

DEVELOPMENT.

The development and subsequent treatment of important miniature film strips call for certain precautions if the final enlarged prints are to be of first-class quality.

They must on no account be over-developed, and should be fixed in a freshly made acid bath. With the great speed of the ultra ortho type and Selo panchromatic films, the danger of light degradation in transferring the film from the tank to the fixing bath can be avoided, and at the same time the film will derive benefit otherwise, by first immersing the apron containing the coiled-up film in a desensitising bath for two or three minutes, using a suitably sized jar for the purpose.

The extra expense is not great, since the desensitiser can be used repeatedly if it is kept in the dark. This preliminary desensitising of the film, besides preventing fogging of the film during transference, tends to give a cleaner image and a finer grain, and obviates markings on the film which sometimes show on tank-developed rolls.

Great care should be observed during washing that no damage is done to the soft gelatine surfaces by scratching from the sharp corners of the film. The writer makes a practice of clipping the ends round before putting the film to wash. When the film is hung up to dry the surface moisture, and especially small adhering drops of water should be removed from both sides by means of a swab of cotton wool that has first been wetted, squeezed as dry as possible, teased out and then wiped gently but firmly down the whole length of film. On no account must these miniature film strips be dried in a current of heat or they will inevitably become grainy and show great loss of quality in the enlargements.

The storage of these miniature film negatives also calls for some precautions. The best method is to keep them in the strip, lightly coiled up, and placed in one of the very convenient storing cabinets which cost only a shilling or two and hold about 40 rolls of film.

IN PICTORIAL WORK.

Makers of miniature cameras usually point out in their descriptive brochures that with all their great advantages

and versatility they are not intended to displace the larger cameras for such work as pictorial landscape photography. While the present writer does not profess to disagree, he is prepared to state from long and full experience that the manufacturers are modest in their claims. Properly appreciated and handled with knowledge and intelligence, the miniature camera is as good as, and often better than, the larger camera ; even for exhibition work.

Let me substantiate this claim. The fundamentals of successful pictorial and artistic photography have no inherent connection with the apparatus employed. Irrespective of the size or type of camera, the photographer is going to use in securing his masterpieces, the essentials in this field are the perceptive mind and eye, the feeling for mood, a knowledge of composition and values, and a general acquaintance with pictorial principles, plus, of course, a sound technique at the productive end.

The user of one of the higher grade miniature cameras, if his taste lie in the direction of pictorial landscape work, has an instrument perfectly suitable for the job. The accurate view-finders, the precision focussing movement, the keenly defining anastigmat lenses, permitting great enlargement in conjunction with the modern ultra-rapid double-coated colour-sensitive films, and the valuable slow automatic speeds of the shutter are the very items called for. Supplemented with one or two light-filters and a lens shade, the tiny camera will produce perfect little landscape negatives from which beautiful pictorial enlargements up to the biggest exhibition sizes can be made.

THE REFLEX.

In the choice of a miniature camera most suitable for pictorial work out of doors the small reflex camera has proved almost ideal. With its full negative-size viewing screen and the facility of differential focussing offered by an $f/2.8$ lens the user can carefully compose his picture and emphasise any particular plane or object at will. The use of a light-filter on the lens for all work, even where the sky is not an important element, is strongly advised as giving always a more harmonious rendering and better quality in the negatives. Where sky or clouds are the chief motif, a light-filter of medium tint is preferable.

Exposure should not be in excess of that indicated by the meter or calculator, allowing, of course, for the filter factor, and it is essential to select a development time suitable to the contrast range of the paper to be used.



From Pilot miniature reflex negative— $f/5.6$ and $1/25$ th sec. exposure.

The low cost of the film is advantageous, since it allows us to make (as is usually advisable) several exposures of each subject from different standpoints without feeling extravagant.

FULL EXPOSURE.

Pictorial photographers know that usually the best pictures are secured early or late in the day, when the actinic value of light is weak, and when exposures must be comparatively long. The miniature camera scores here since the lens can be kept fully open without serious loss of depth of focus. It is not merely a case of being able to give an automatic exposure without a tripod; there are often some moving objects in the scene, such as wind-swayed branches or cattle or water. If a larger camera, with its necessarily much longer focus lens, is used, the stopping down usually called for makes it necessary to increase the exposure and risk a spoiled negative through movement; while if a fairly rapid shutter speed is used to stop the motion then the fatal risk of under-exposure cannot be avoided in such circumstances.

There is another point scored by the miniature camera in outdoor work. We sometimes wish to include persons unconscious of their inclusion. The diminutive size and unobtrusiveness of the camera make this an easy matter. Let the photographer set up a hand-stand camera or bury his head in the hood of a big reflex, and everyone in the vicinity begins to take notice.

PORTRAITURE.

It has been well said on many occasions by leading photographers that photography probably finds its best expression in the realm of portraiture. The big camera is no longer essential for this work, nor is the medium sized one to-day in an unchallengeable position. The photographer who is contemplating the making of really good and acceptable portraits in the every-day surroundings of his family, friends and others, indoors or out of doors, may question whether the miniature camera can be suitable for this rather exacting work. He need have no doubts. Properly handled, the miniature camera can be as productive of fine quality portraits as a studio camera or any other type.



From Small Rolleiflex negative; exposure $1/25$ th sec. at $f/2.8$ on dull day.

Does the high-grade modern miniature camera offer us a really suitable instrument for serious portrait work?

In order to produce portraits, apart from the necessary knowledge and skill of the photographer in posing, lighting and arrangement, there is called for a perfectly trustworthy instrument, suitable negative material, a good rapid lens and quickness and simplicity in use of the camera; and, we might add, low running cost. All these requirements are fulfilled in the miniature camera and the films of fine quality available.

In practice it is important to secure perfectly sharp focus. Portraits are "close-up" subjects where even with a lens of 5 or 6 cm. focal length the depth is very shallow. We can

measure the actual distance with a tape and set the scale accordingly, but for perfect certainty either the miniature reflex or the Leica or Contax offers undoubted advantages.

It is fairly easy to make in many circumstances portraits indoors at 1/10th or even 1/25th second with the camera held in the hands. The writer makes quite a lot, and they are fully timed. Nevertheless, it is preferable to have the little camera on a light tripod with a ball-and-socket head, and to use a fairly long cable release. The short stiff ones usually supplied with the camera are apt to cause camera movement when the plunger is pressed. The eyes of the sitter should be focussed dead sharp—an easy matter when employing the magnifier attached to the hood of the miniature reflex, or a range meter. If the lens in use is of 5 or 6 cm. focus it is preferable not to fill the entire picture space when large heads are being photographed. The writer finds that an area of $1\frac{1}{2} \times 1$ in. of negative results in an excellent enlargement of whole-plate size without any apparent perspective distortion.

LARGE HEADS.

The camera should be kept fairly high when doing large head portraits. If the lens is kept on a level with the eyes foreshortening effect will be avoided. Indoors a full exposure is advisable. Here we may safely give the film twice that indicated by the meter and develop for not more than two-thirds the normal time. A very satisfactory strip of negatives will then result, particularly if Verichrome or Selo-Panchromatic film is used, the latter being especially good for fair sitters, while the former seem, in the writer's hands, ideal for brunettes. When photographing dark people it makes for better portraits if the lighting of the hair is almost frontal; with fair-haired sitters a somewhat back lighting gives a more pleasing result. Enlarging will be dealt with in more detail shortly; meanwhile it should be noted that graininess, which might spoil the skin texture quality, can be avoided when enlarging from Verichrome film by using a diffused light, either wholly, or if a condenser is used, by interposing a piece of opal or fine ground glass between the illuminant and the condenser.

The modern roll-films, with their double coating, anti-halo backing and great latitude, allow of a certain amount of over-exposure without marring the end result; it is nevertheless as well not to take too much advantage of this. In portrait work with the miniature camera where we have in mind a relatively big enlargement of, say, half-plate to 10×8 ins., we must preserve every bit of possible quality in the little negatives.



From Leica negative with $f/3.5$ stop and $1/40$ th sec. exposure.

This can be achieved by exactitude of focus, careful calculation of the exposure, short time of development in the tank and diffusion of the illuminant in the enlarger. Retouching can be made unnecessary by using a pale light filter on the camera lens and a *slight* diffusion of the image while enlarging.

THE NEW PHOTOGRAPHY.

We are all aware by now of the remarkable change in expression that has taken place during the last decade in the fine arts. In music, painting, literature and sculpture and the graphic media there has been, in many quarters, an abandonment of the classic traditions in favour of an intense modernity of spirit. The conventions and repose of the past have given place to virility, angularity and new view angles in the creative efforts of the artistic workers of to-day; and not only in the field of amateur work, but also in the illustrative and commercial realms, particularly as regards the graphic arts. Whether this fresh phase will endure and displace the old is not a matter for discussion here, but there is no doubt that as far as photography is concerned a new and great interest has been aroused, striking originality manifested, and, above all, the fundamental qualities of our medium, the exquisite beauty of the purely photographic processes at their best, have been demonstrated. The new photography has shown widely what only few have realised hitherto—that photography is essentially a method of representation rather than interpretation. This explains the stark realism, the clear-cut delineation and the passion for technique in the products of the leading exponents of the new photography.

The endeavour to get away from the ordinary is evidenced by the unusual view point in the picturisation of ordinary and everyday subjects and incidents. A series of travel photographs is no longer a collection of conventional landscapes and buildings, street scenes and groups. We now seek the small bits under dramatic lighting conditions, as a cat's eye or eagle's eye view. We want pictures of arrested motion of people at their usual tasks in "close-up" size. We are on

the look-out for the striking pattern and the unusual form ; and always we want detail, depth of definition and flawless technique. The precision miniature camera has beyond question contributed largely to the wonderful results seen in modern photography. An examination of the many reproductions available of photographs illustrating this new movement is a convincing proof of how the modern miniature camera finds the aptest employment in this field. We observe



Enlargement from negative with small Rolleiflex. Exposure, 1/50th sec. $f/2.8$

detail and great depth of focus in subjects where the conditions have called for great lens rapidity and high-speed shutter exposures, though the subjects have been dark near ones and the prevailing lighting not too favourable. The special peculiarities of the miniature camera make such results possible, and certain in the hands of the worker who has mastered its use, and the photographer possessing the original outlook and quickness in decision can produce pictures that will stand comparison with the best if he will appreciate its qualities and develop the proper technique.

Coming to practical matters, the use of the special fine-grain film is indicated where the utmost detail and sharpness are desired in big enlargements. In work where low contrasts prevail or where the lighting is dull or flat, the Agfa Isochrom film seems one of the best for obtaining brilliant negatives, development being done for the normal length of time.

ENLARGING.

Frequent allusion has been made in the foregoing to enlarging from miniature negatives. This essential operation may now be advantageously treated at greater length.

It is of prime importance to keep in mind, all the time from the loading of the camera to the drying and storing of the miniature film strip, that the end result is to be a comparatively big enlargement of unquestionable quality which will challenge comparison with a like-size enlargement made, say, from the whole of a quarter-plate negative. Every step in the routine should be taken with the greatest forethought, care and deliberation.

There must be no evidence of camera movement; no incorrectness in the focussing, exposure and development must be right, and defects of a chemical or physical nature must be scrupulously guarded against.

It should be recognised that in order to achieve, in serious miniature camera photography, pictures worthy of the name, one's methods must be far more meticulous and precise, and pursued with much greater attention to exactitude, than is demanded when working in larger direct sizes.

But granted these conditions, and they are easily attainable, the finest results are possible, as is clearly evidenced in the many magnificent and beautiful photographic enlargements of imposing dimensions exhibited as specimens by the makers, and to be seen on the walls of photographic exhibitions.

The present writer, if he may say so with due modesty, has made magnificent enlargements, particularly with the small Rolleiflex camera that are in every way equal to the best shown by the makers.

Granted then, that by careful working methods and irreproachable attention to the details mentioned, we have secured the right sort of negatives, a consideration of the apparatus and manipulation for the purpose of enlarging them is now indicated.

ENLARGING APPARATUS.

It may be as well to state somewhat dogmatically that for the best results one or other of the specially designed enlargers is desirable if not altogether essential. Many are to be seen advertised or reviewed in the B.J.A., and the makers' lists will furnish fuller information. Very good ones can be had from about £5, while at the de-luxe end of the list there is a projection printer costing about £27, having special refinements in the way of beautifully made and interchangeable

masking devices, optically worked red cap for the lens, and minutely adjustable masking frame for the bromide paper.

The enthusiast will provide himself with the best he can afford. They are all good, however, and will all turn out perfect enlargements when used properly.

The first step is the preparation of the negative. In spite of all our precautions there will be tiny pinholes to be filled in or some unwanted specks or other matter to be removed from one or other of the gelatine surfaces.

For this purpose an inexpensive retouching desk can easily be constructed as follows.

The strip of negative should be kept uncut, as it is very difficult to handle the tiny single "frames."

SPOTTING NEGATIVES.

Take a cleaned piece of glass about quarter-plate size, and cut a mask of medium thick card the same size. Remove a piece from the centre a little larger than the negative area. See that the edges of the glass are smoothed off and then fasten glass and card at one of the longer sides by gluing on a hinge of linen tape. The strip of film can now be sandwiched between the glass and the hinged mask and easily moved, so as to bring any negative within the aperture of the mask. The sides of the mask hold the film flat, and at the same time allow a resting place for the hand and fingers without danger of marking the surface of the film. A piece of three-ply wood, about 10×8 ins., with an opening cut out of the centre about $3\frac{1}{2} \times 2\frac{1}{2}$ ins. area, serves to support the sandwich and cuts off extraneous light while spotting. Two simple metal finger springs screwed on to the board will hold the film in its support. The desk can be held at a convenient angle by means of two wooden legs fastened at two top edges and a sheet of white drawing paper on the table will reflect light through the negative. The only other requirements are a best fine sable brush, a pan of black water-colour pigment, artists' quality, and a container for water.

The secret of successfully obliterating the tiny transparent spots in the miniature negative without encroaching on the surrounding area is as follows:—Dip the brush in clean water, lightly rub it over the pigment and trail it with a twirling motion along a piece of white paper until the tip becomes perfectly pointed, and until this point just leaves a faint grey line of colour on the paper. Now, steadying the little finger side of the hand on the edge of the mask, just touch the spot with the extreme point of the brush. The pinhole

will then disappear. Some will find it a help to wear a pair of spectacles with strong lenses during this operation.

Before adjusting the film in the "gate" of the enlarger, dust both surfaces of the film with a fairly large, soft-haired brush to remove specks and hairs, thus avoiding white spots on the print which entail tedious work in spotting out.

In the choice of size, surface or kind of paper the photographer has a free hand. Sometimes a slight diffusion during enlarging goes a long way !

THE ILLUSTRATIONS.

The following is a list of the reproductions arranged in the order in which they appear in the book.

- | | |
|---|--|
| A. KOCH (Graz, Austria).—
Der Abend näht. | E. SOUGEZ (Paris).—The Egg. |
| CHRIS. J. SYMES (Birken-
head).—Caudebec. | VIOLET BANKS (Edinburgh).
—Wedgwood. |
| DONALD MCLEISH (London).
—In the Dauphine Alps. | ARTHUR F. KALES (Los
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| ISMA Y TAYLOR (Harrogate).—
The Virago. | E. R. YERBURY (Edinburgh).
—The Model. |
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—Walton Adams, Esq. |
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| PAUL SHILLABEER (London).
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BEE BELTON (London).—
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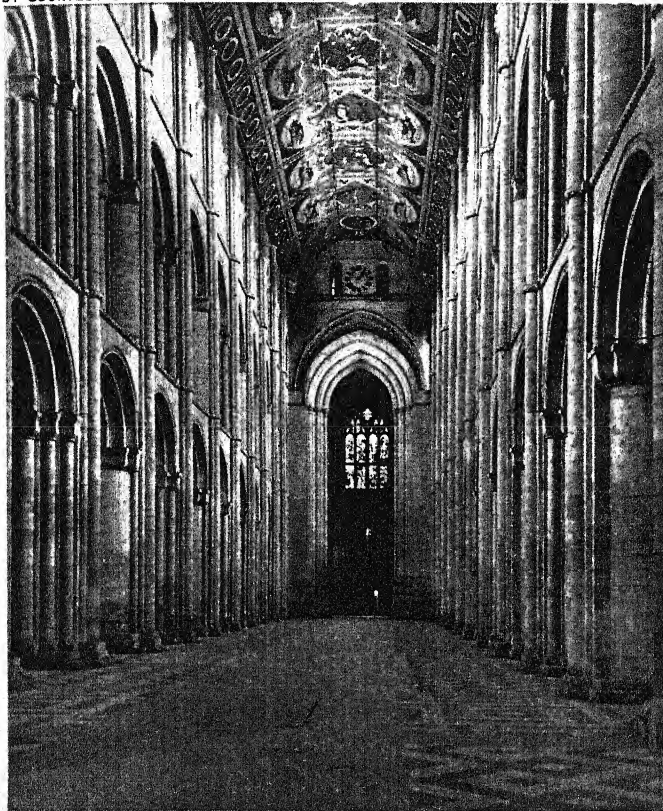
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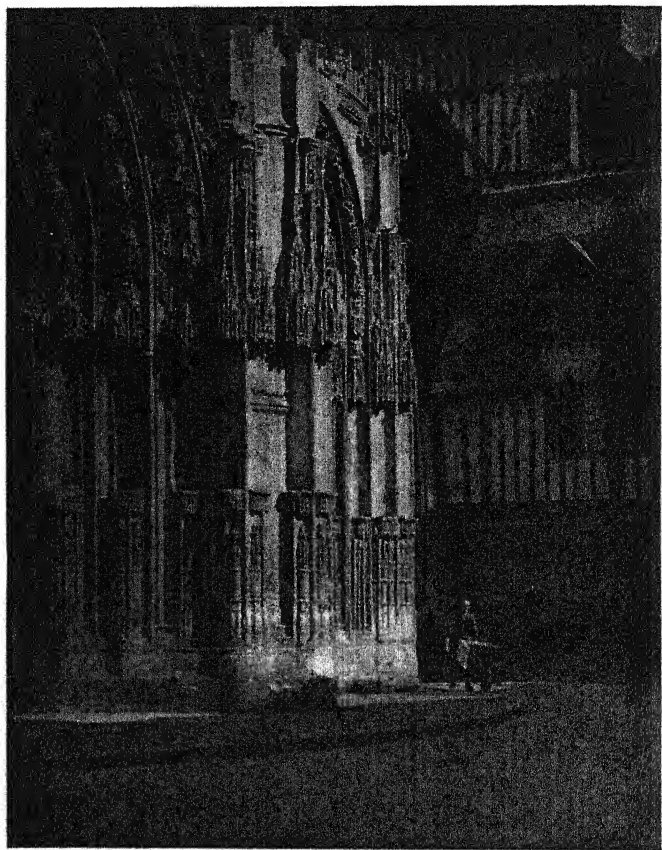
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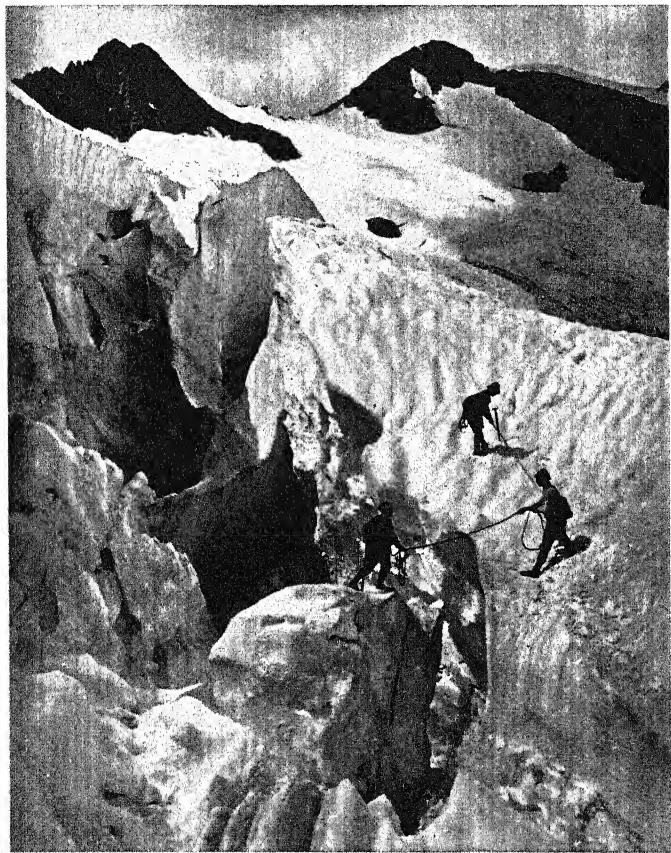
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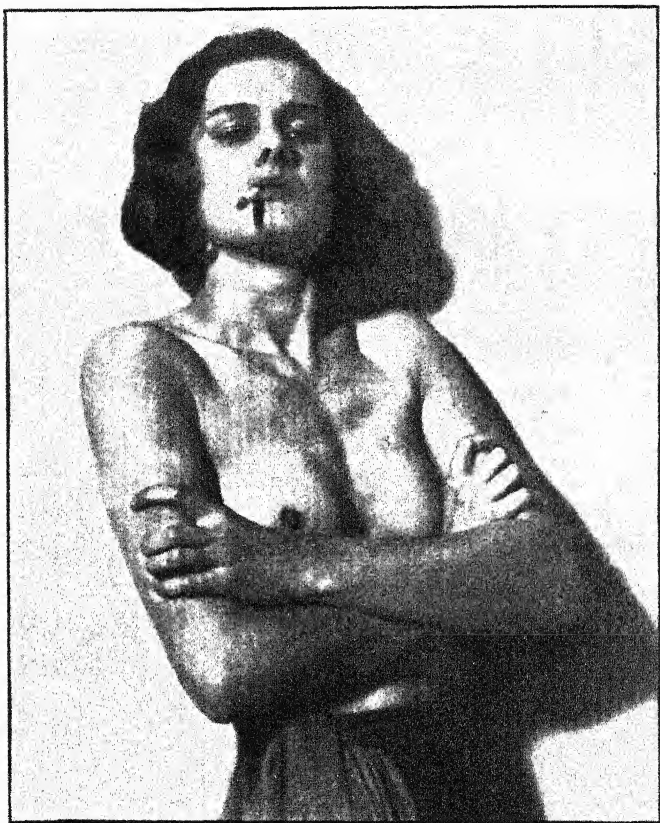
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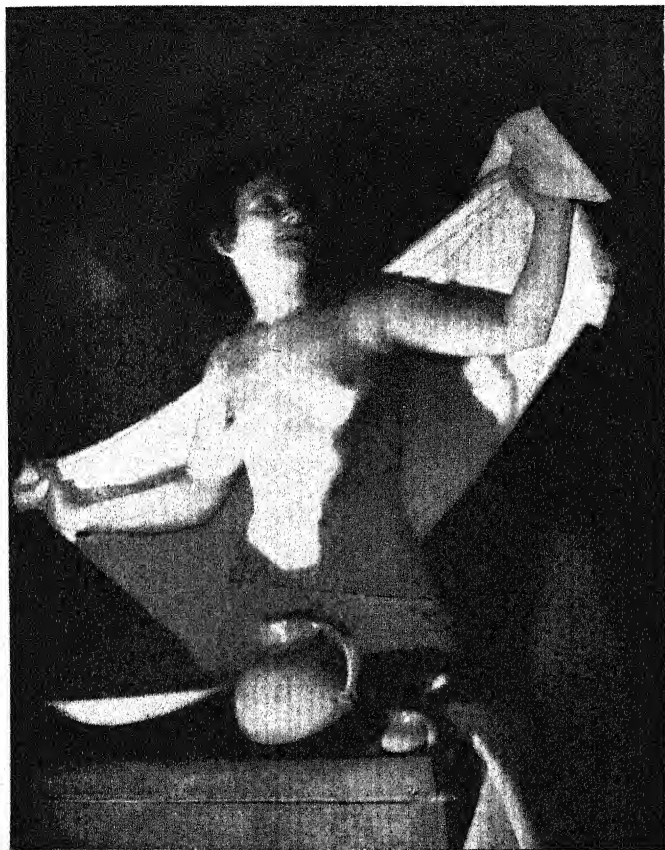
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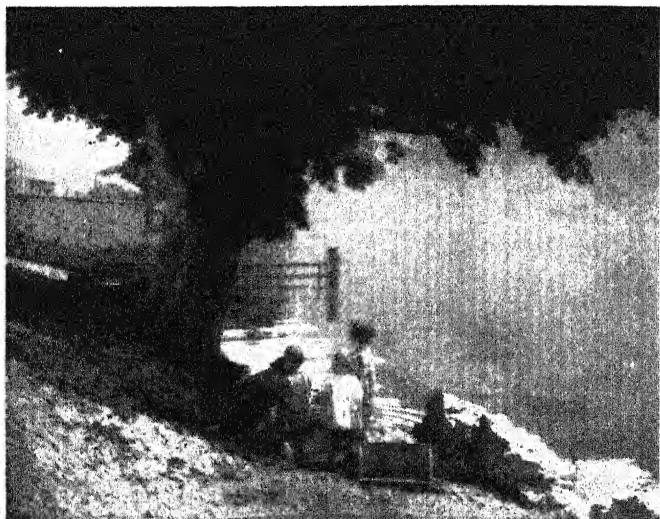
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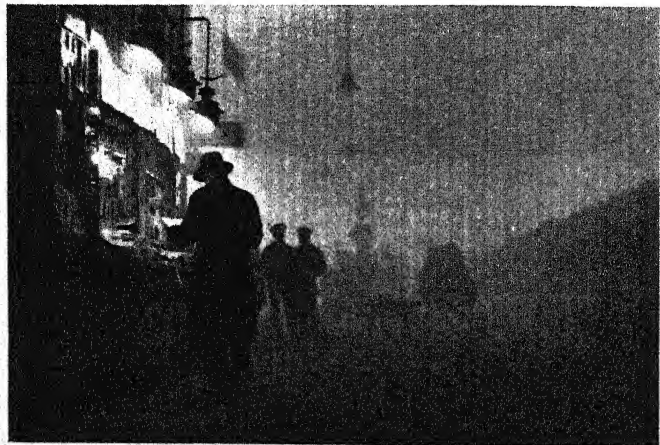
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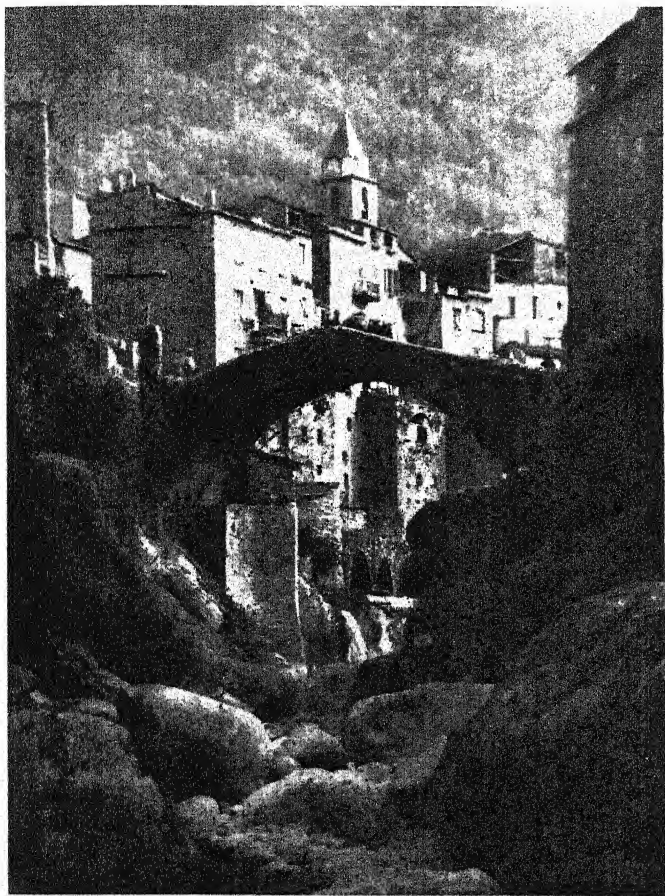
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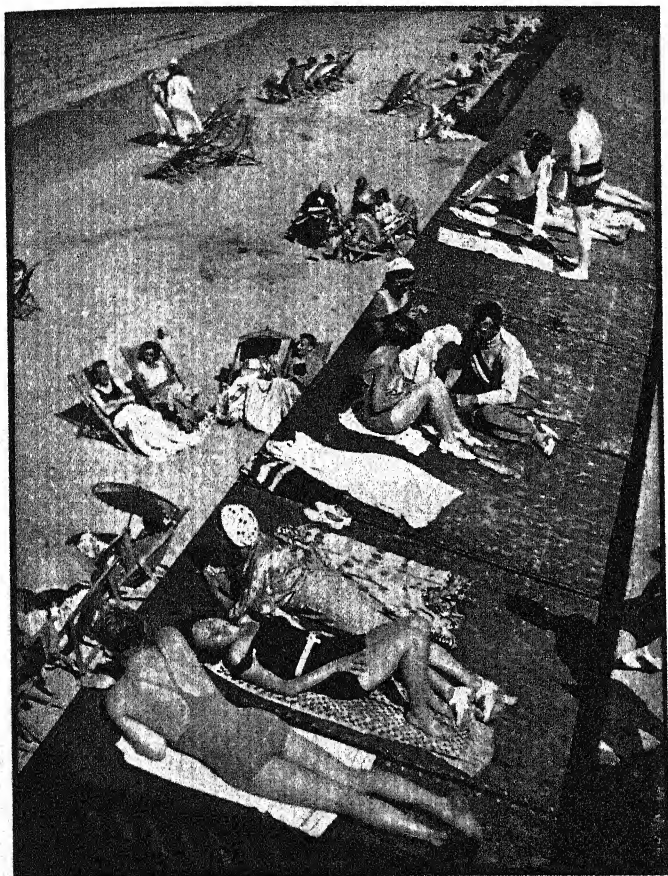
MIRAMOVA

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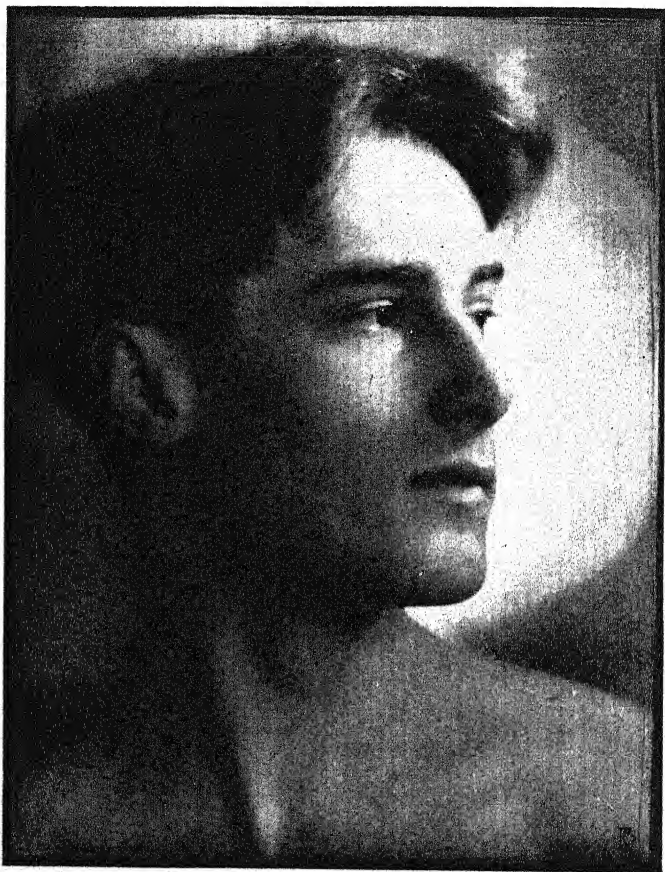
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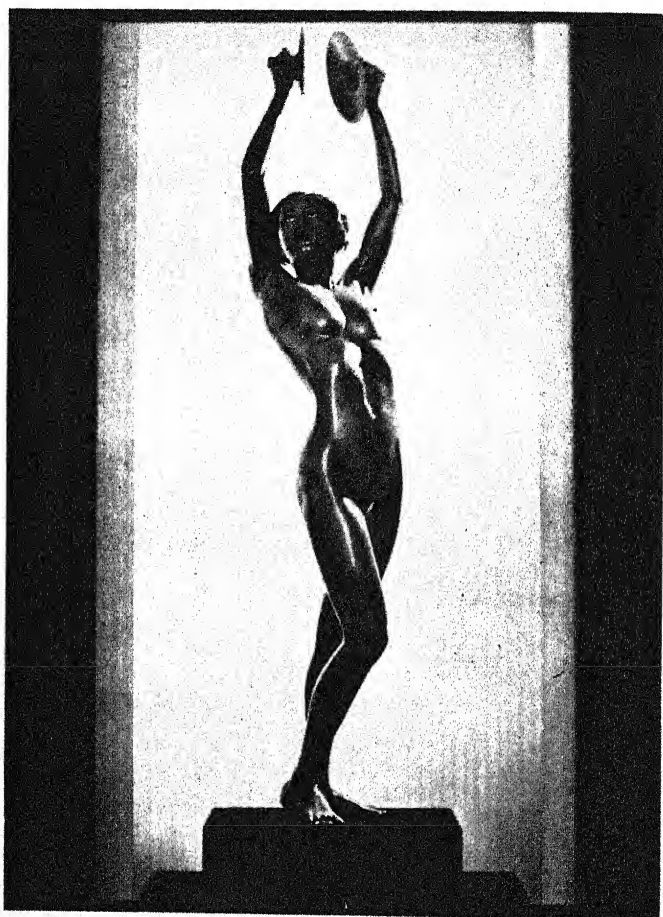
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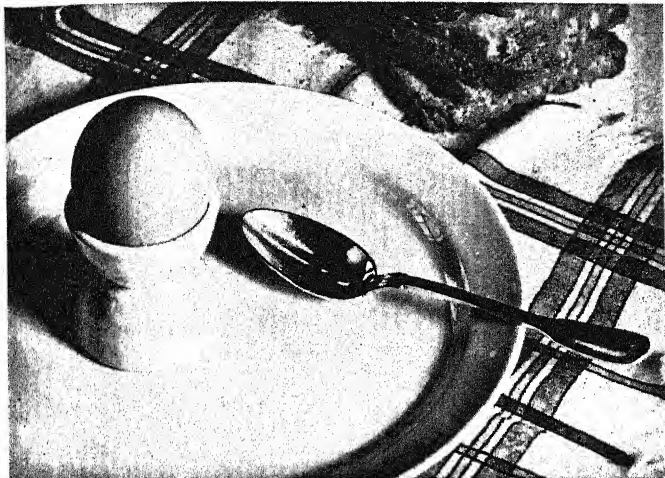
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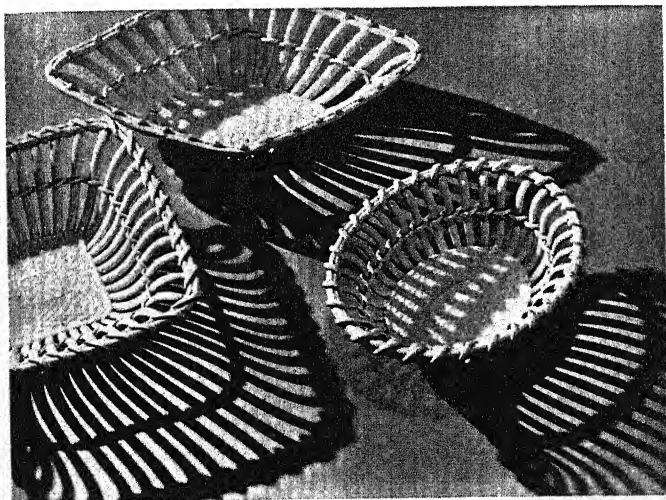
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E. SOUGEZ



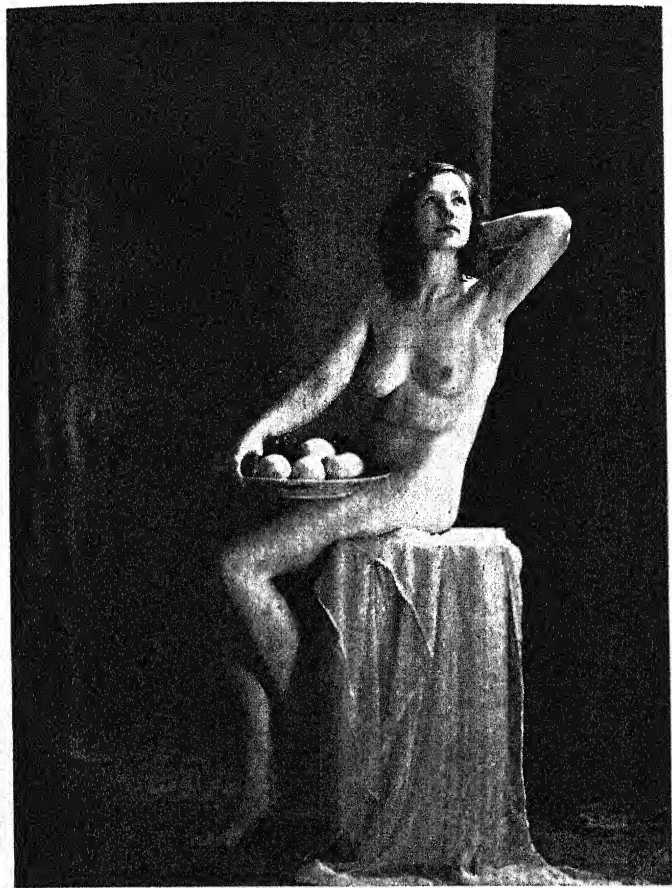
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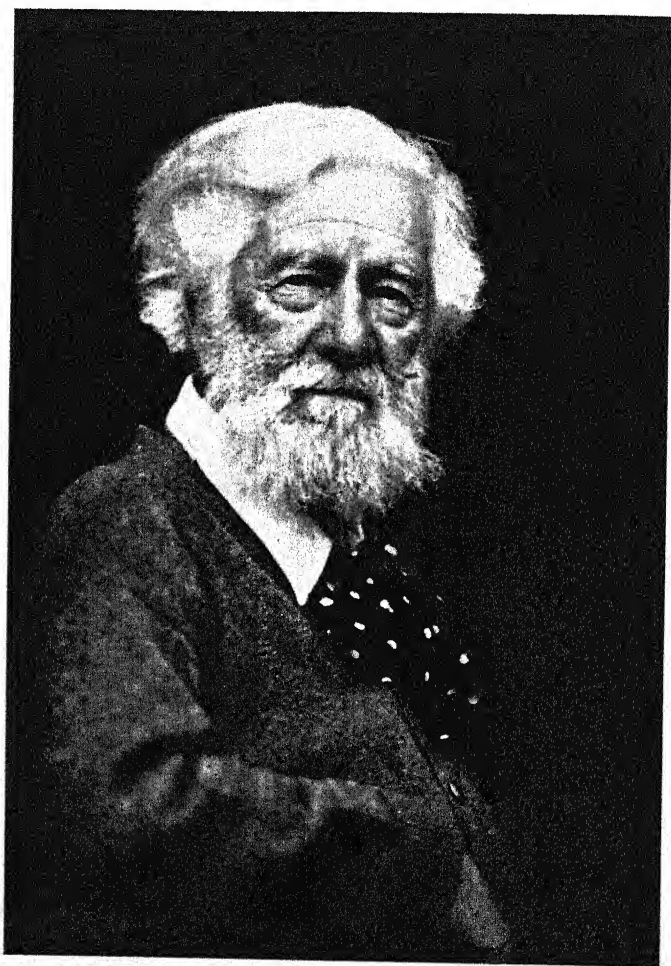
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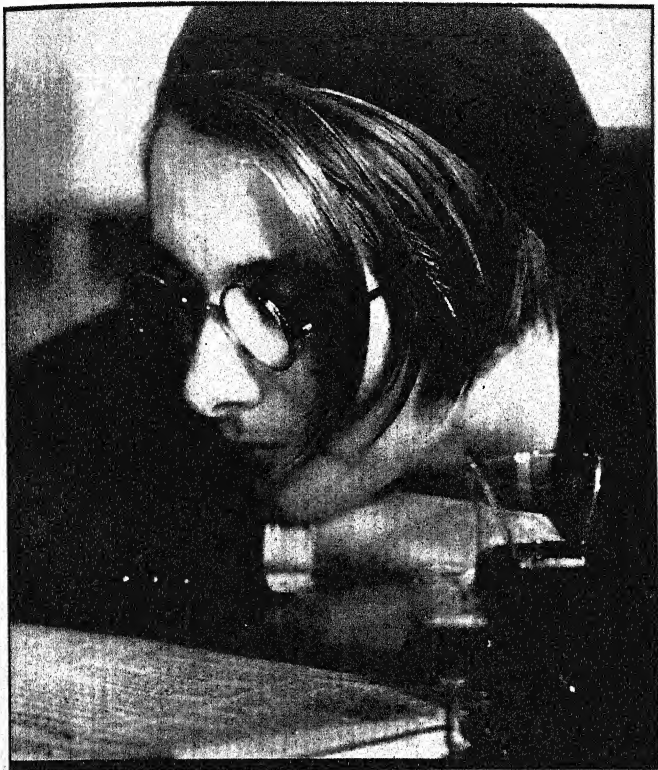
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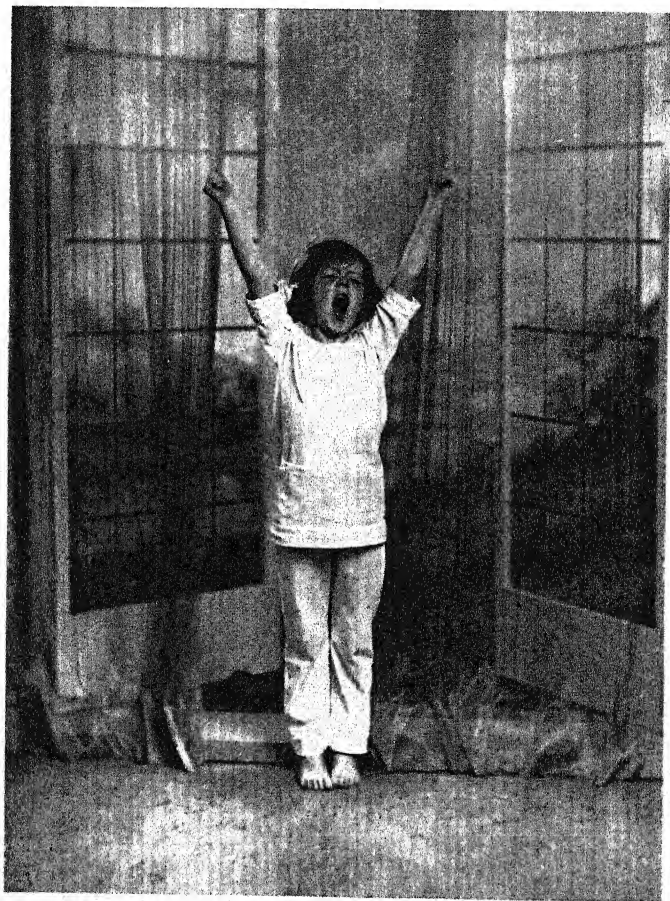
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KEITH DANNATT



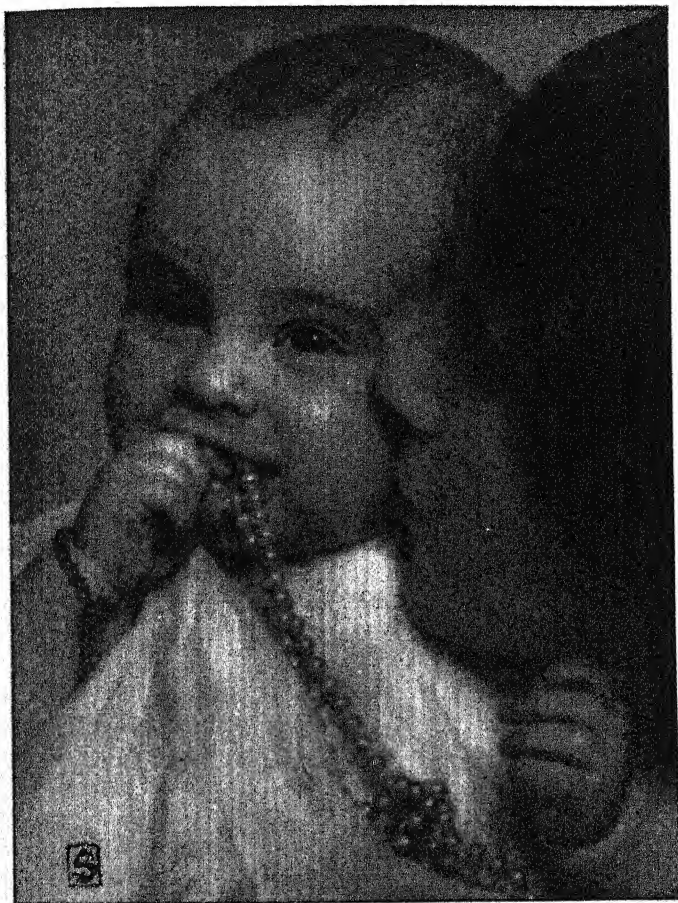
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R. HAWKINS



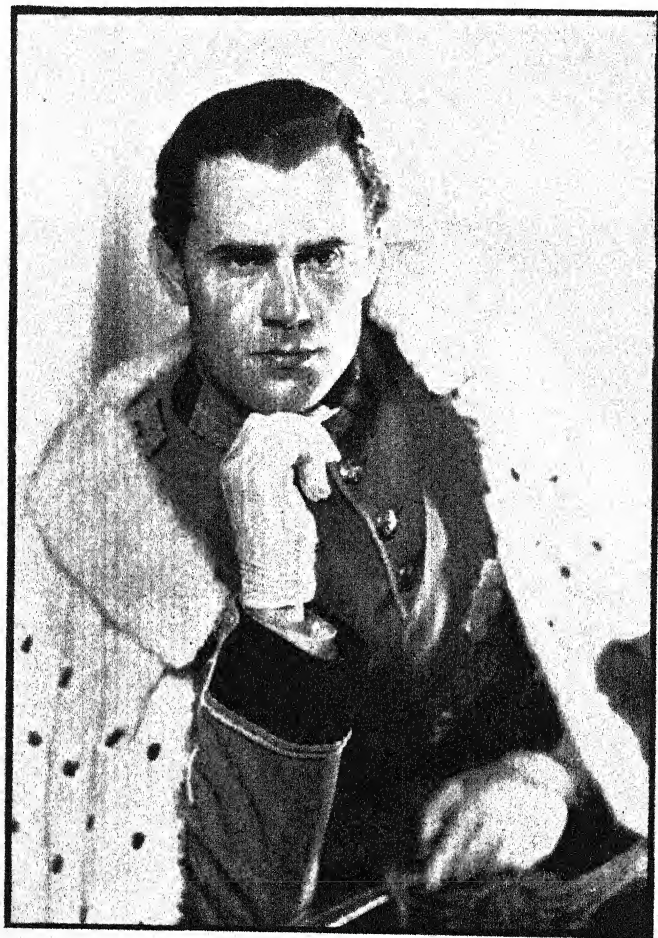
YAWNIDOODLE

ARCHIE HANDFORD



CHILD WITH MOTHER

STEPHEN SHORE



ROMILLY LUNGE AS SEBASTIAN IN THE EDWARDIANS JOHN ERITH



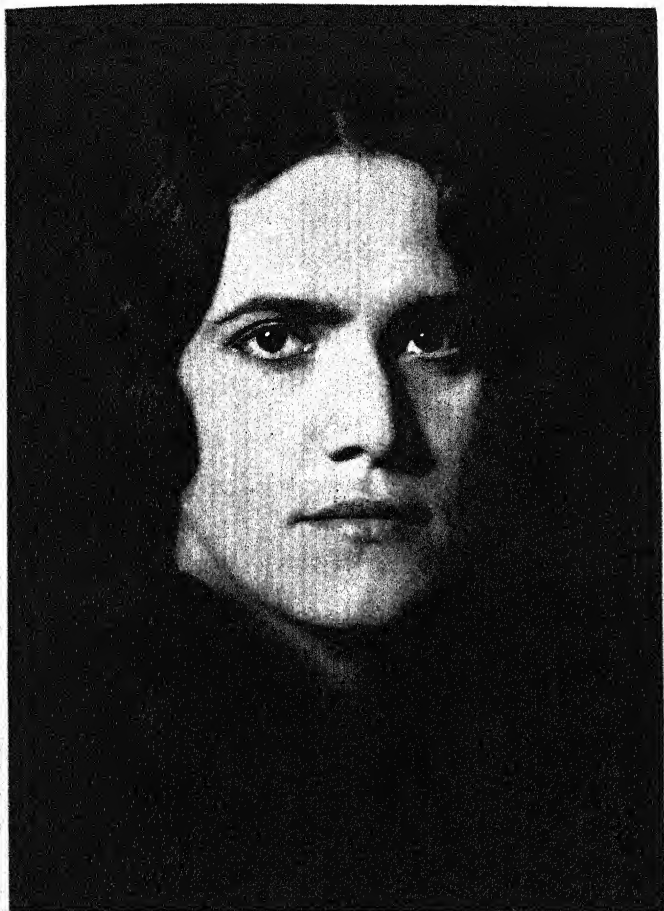
A DAUGHTER OF THE STEPPES

DOUGLAS



COMPOSITION

WALTER LEE



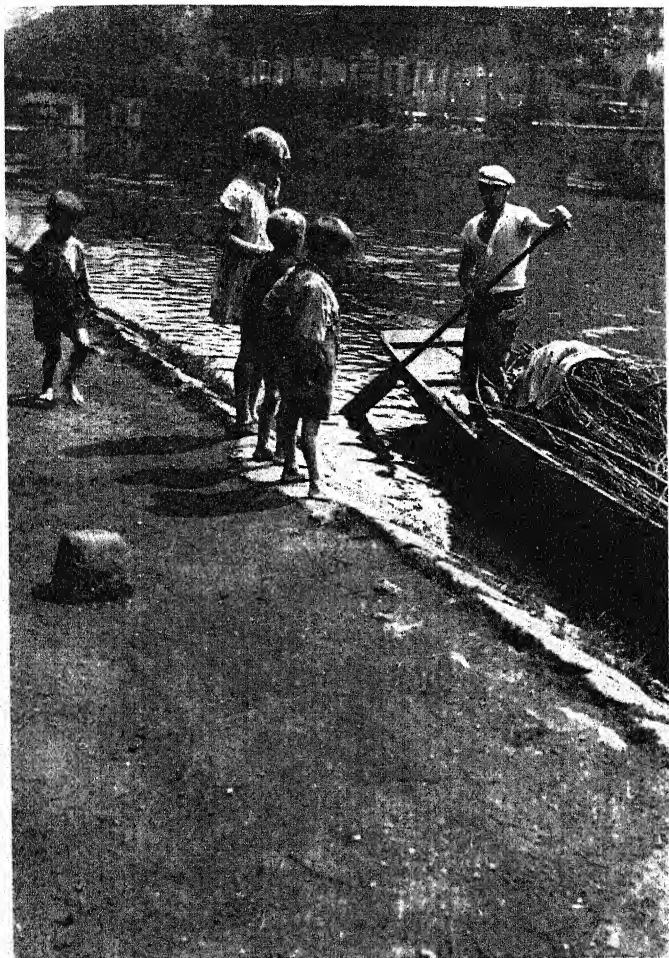
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DANIEL MASCLET



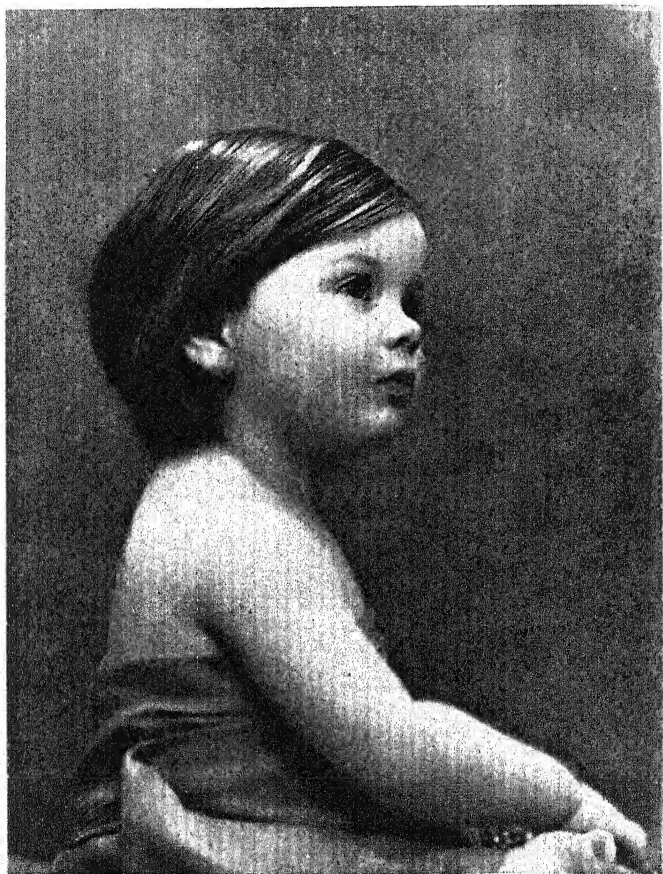
THE WHITE BONNET

DR. A. GRABNER



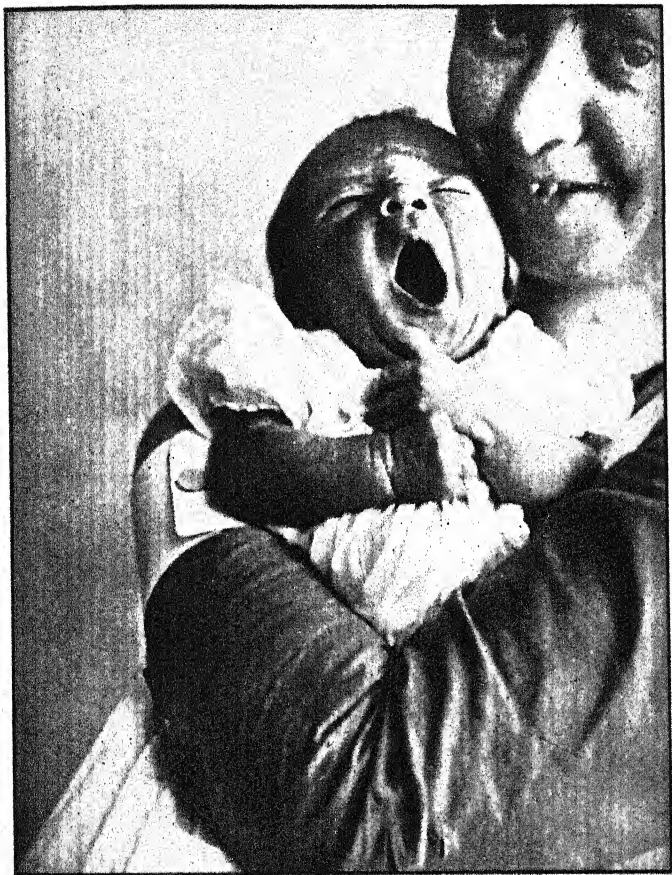
THE REED BOAT

GEORGE HAWKINGS



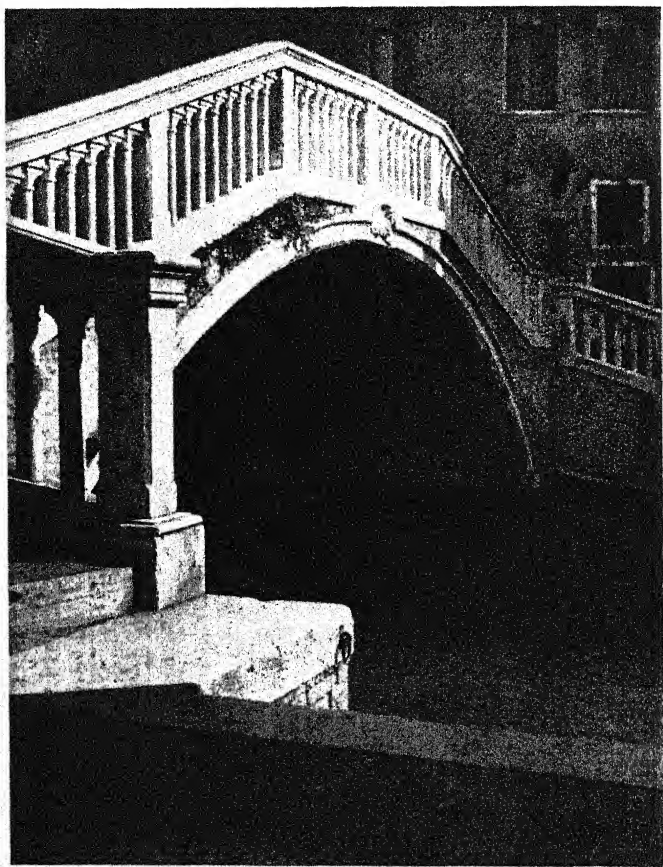
GILLIAN

RUSSELL CRIMP



WHO CARES ABOUT THAT?

RICHARD N. HAILE



A BRIDGE IN VENICE

DR. D. J. RUZICKA



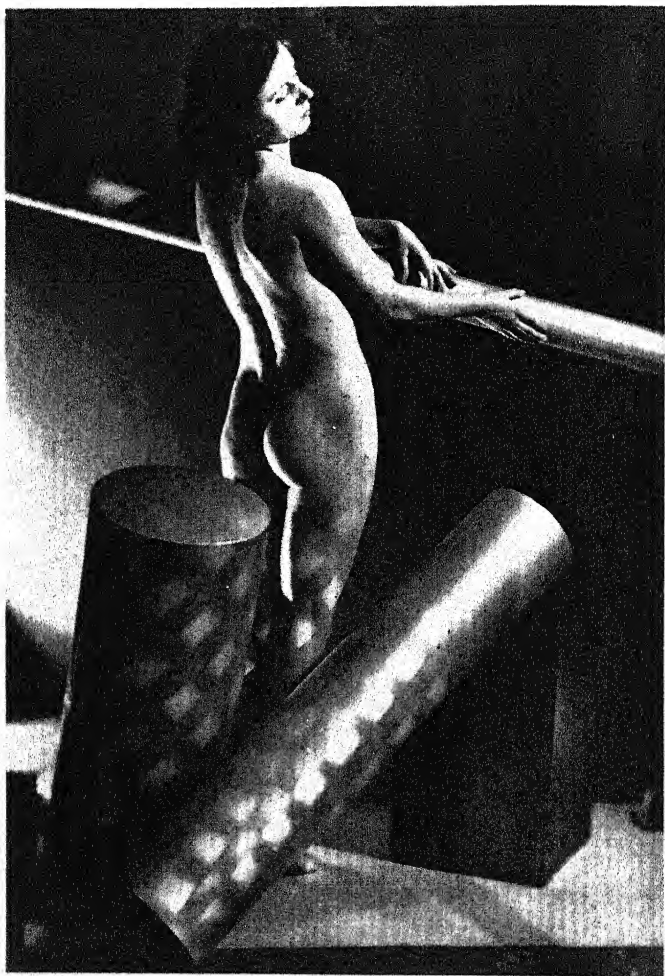
A GALWAY COTTAGE

H. WADSWORTH HAYWOOD



LAKELAND

OCTAVIUS C. WILMOT



NUDE

J. PECSI



POISE

DOROTHY WILDING



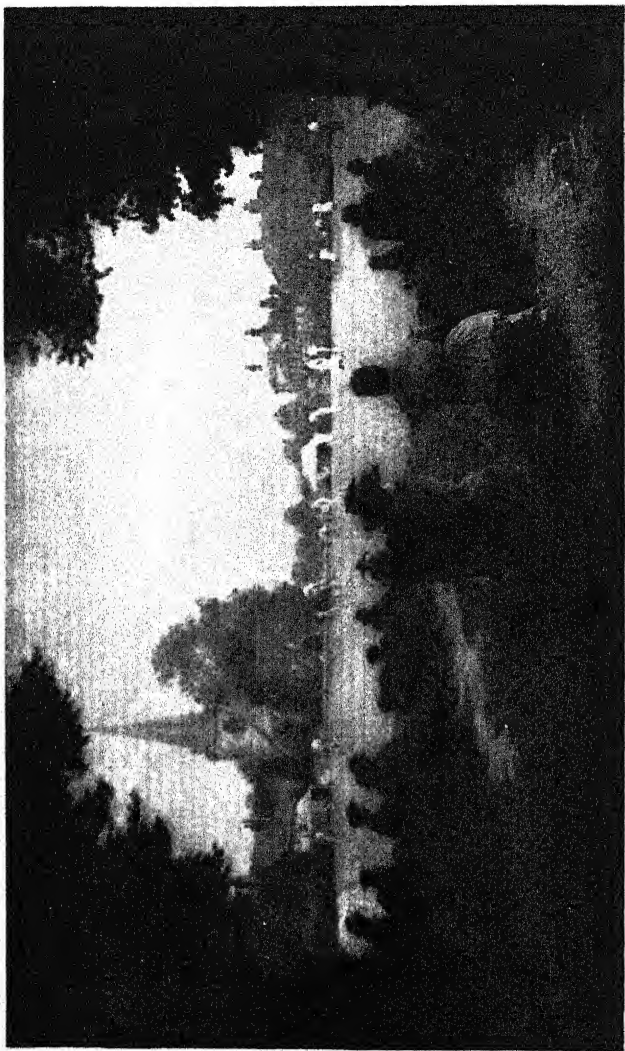
LOUIS J. McQUILLAND

MARGARET BENTLEY



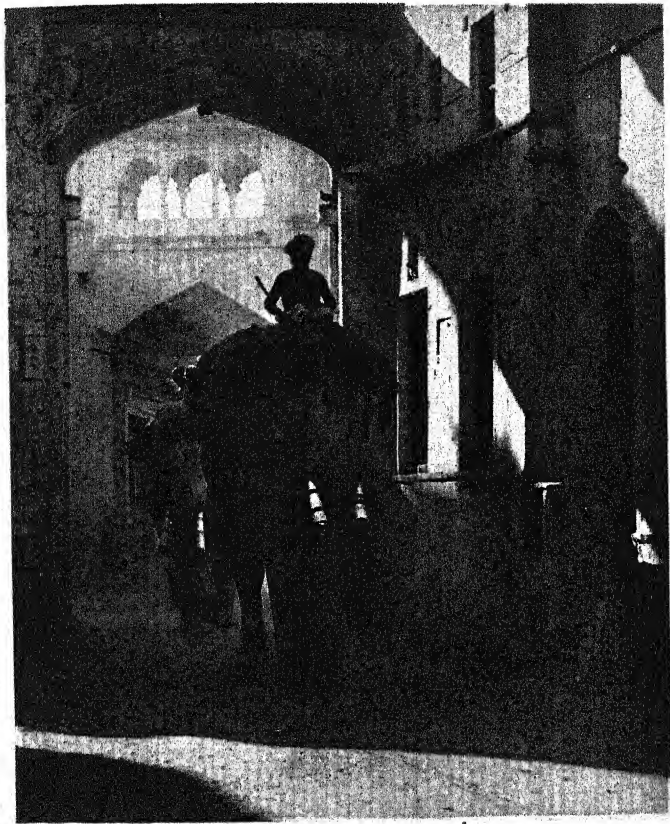
THE STUDENT

F. G. CURSON



THE VILLAGE GREEN

S. BRIDGEN



IN A RAJPUT CITY

L. B. SPILSBURY



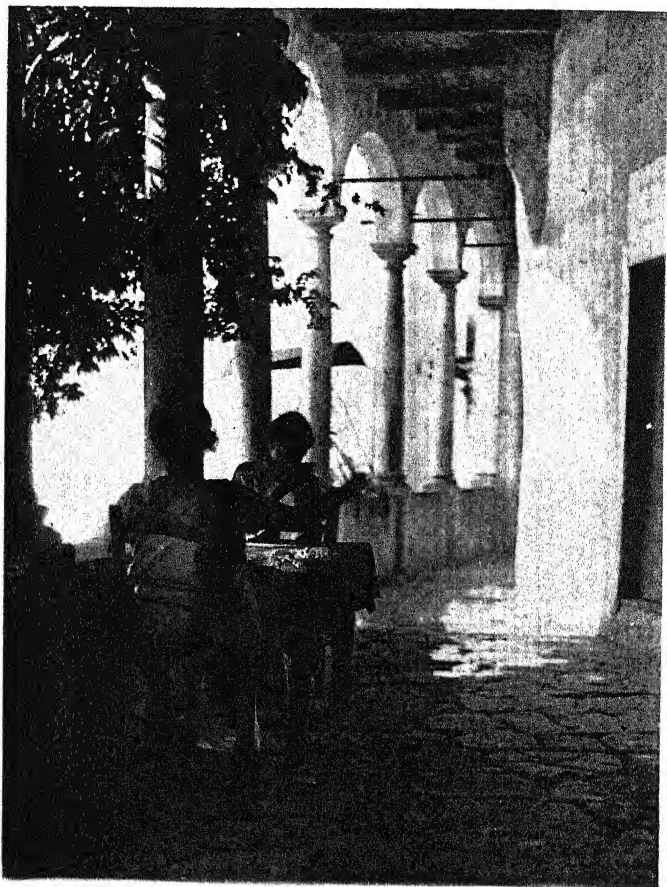
LA PETITE JOYEUSE

FRANK DAVIS



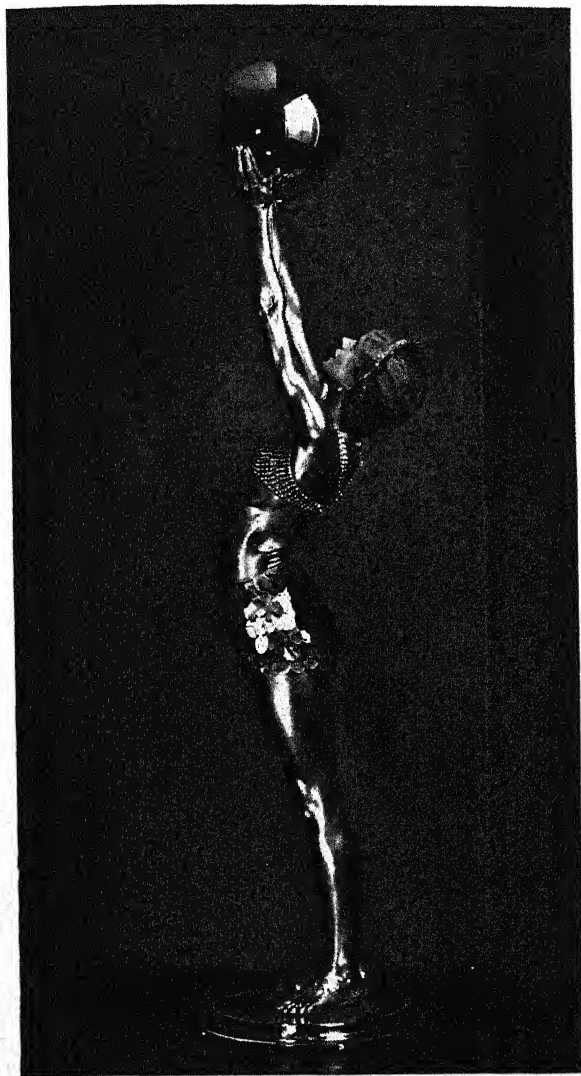
THE BLACK HAT

MARCUS ADAMS



SANTA CATHERINA

M. K. PENRICE



THE SILVER BALL

E. DRUMMOND YOUNG



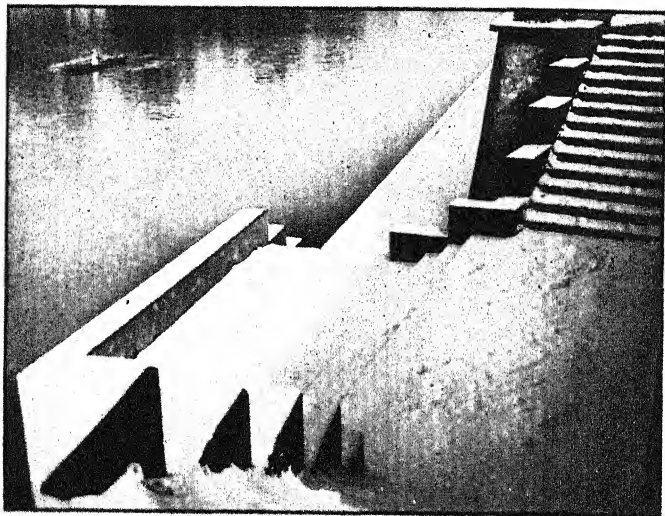
REST TIME

YVONNE GREGORY



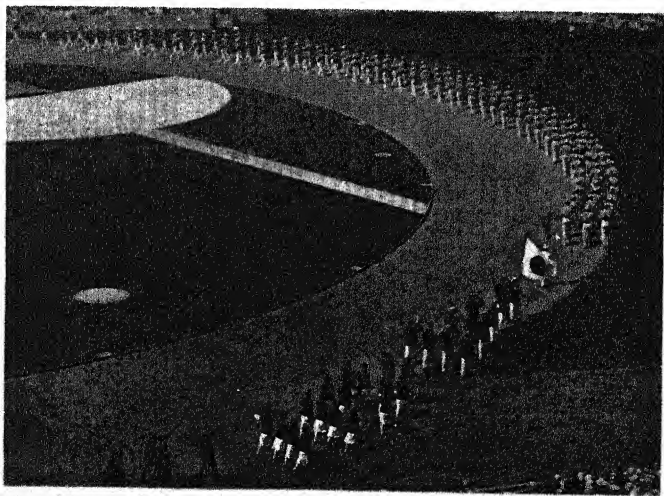
LA MENINO

MARGARET ELLSMOOR



FLIGHT OF STEPS

GIULIO CESARE



TENTH OLYMPIAD

T. K. SHINDO



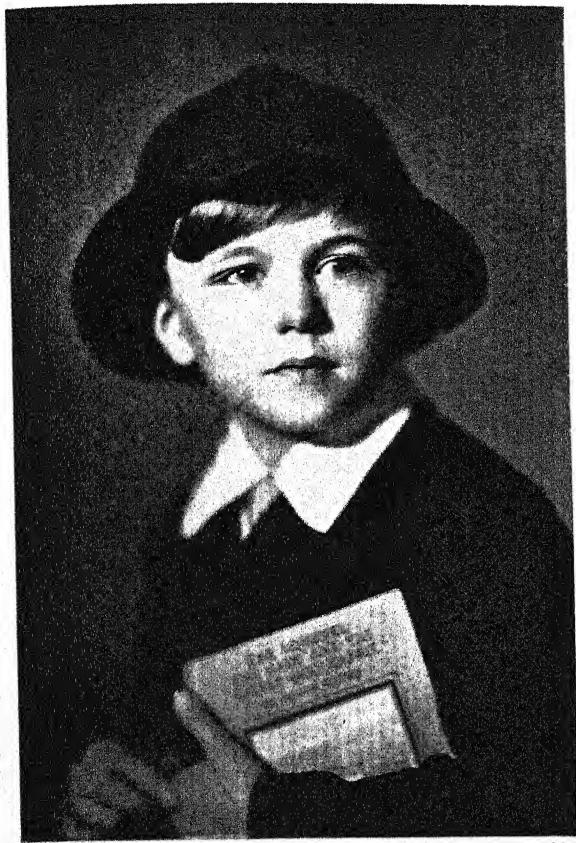
MRS. ALAN GOWER

MESDAMES MORTER



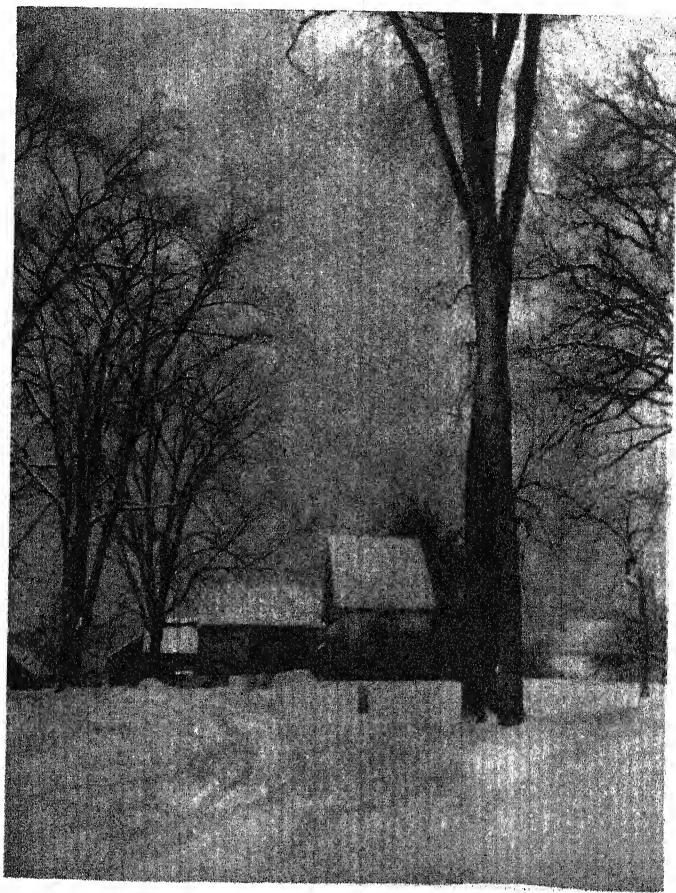
WILD FLOWERS

MARCUS ADAMS



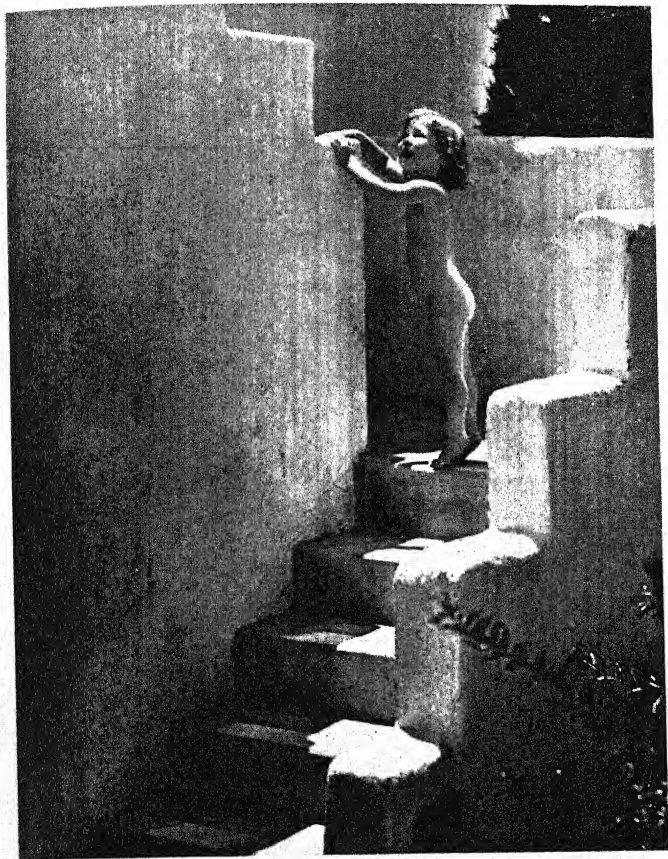
MY SON

DAISY E. EDIS



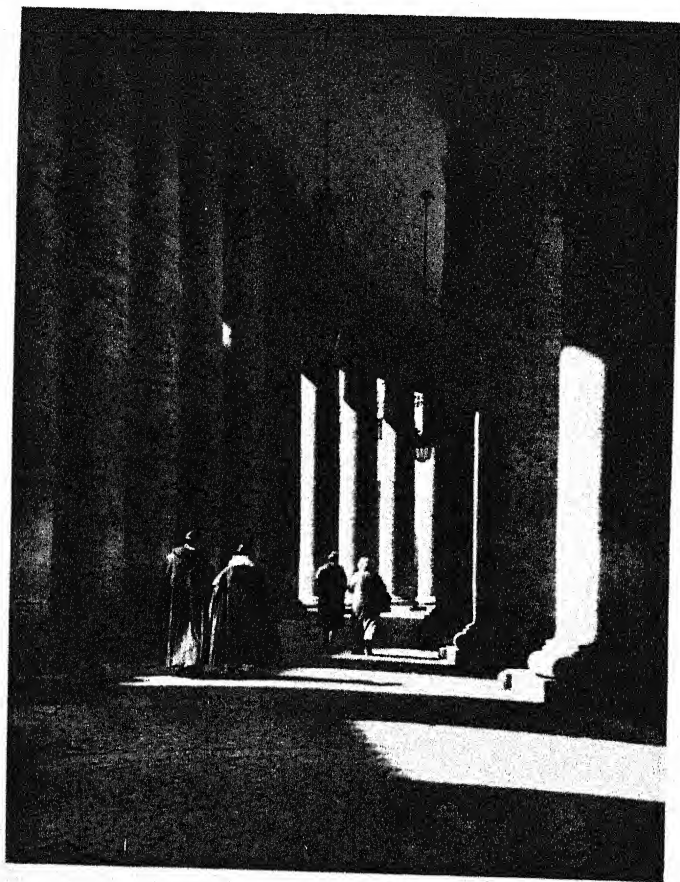
THE CLOVEN ELM

F. R. FRAPRIE



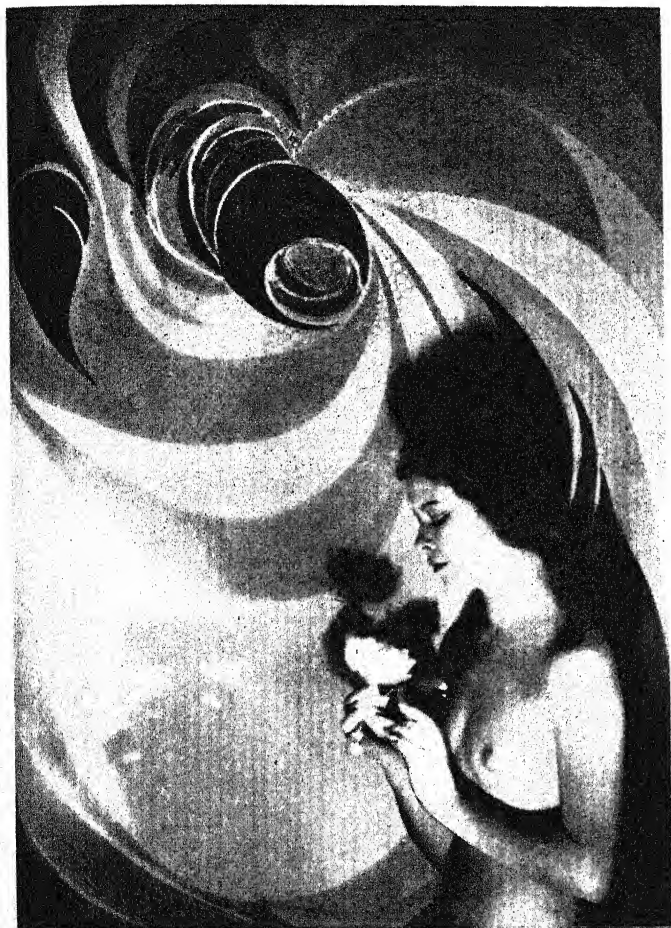
GOOD MORNING !

JACK BARSBY



THE COLONNADE, ST. PETER'S, ROME

DR. D. J. RUZICKA



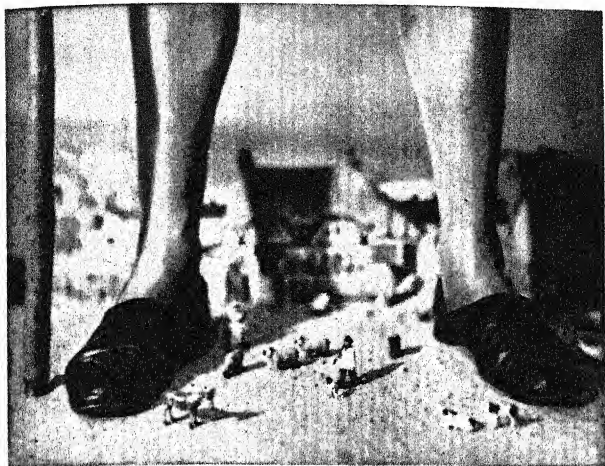
LOTUS

FRED R. DAPPRICH



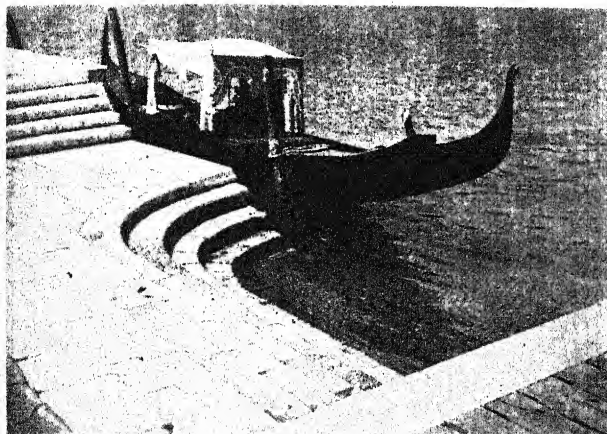
READY

BEE BELTON



LILLIPUT

LAURIE BLACK



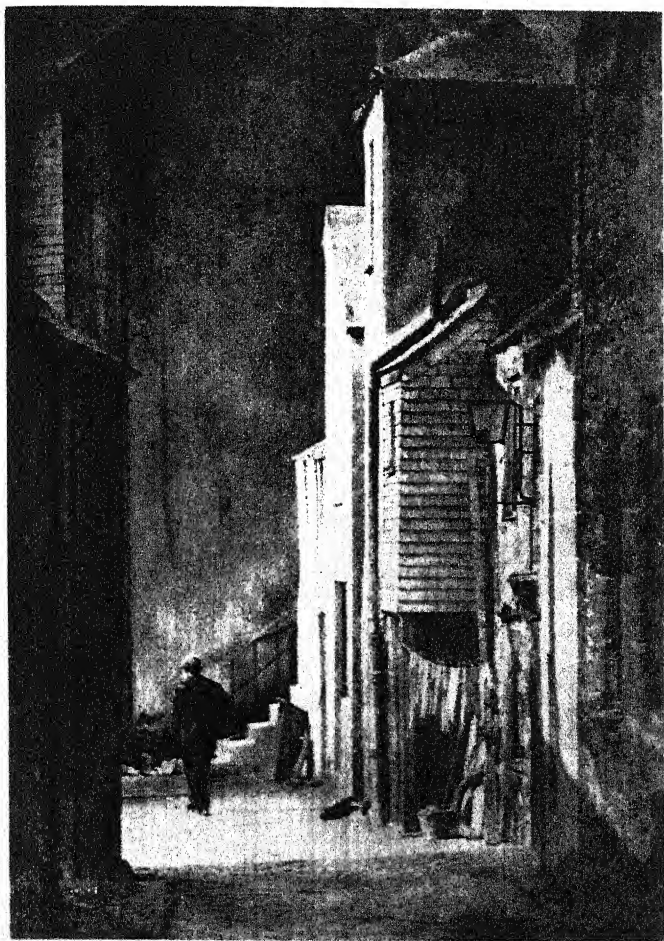
VENICE

JOHN ST. AUBYN



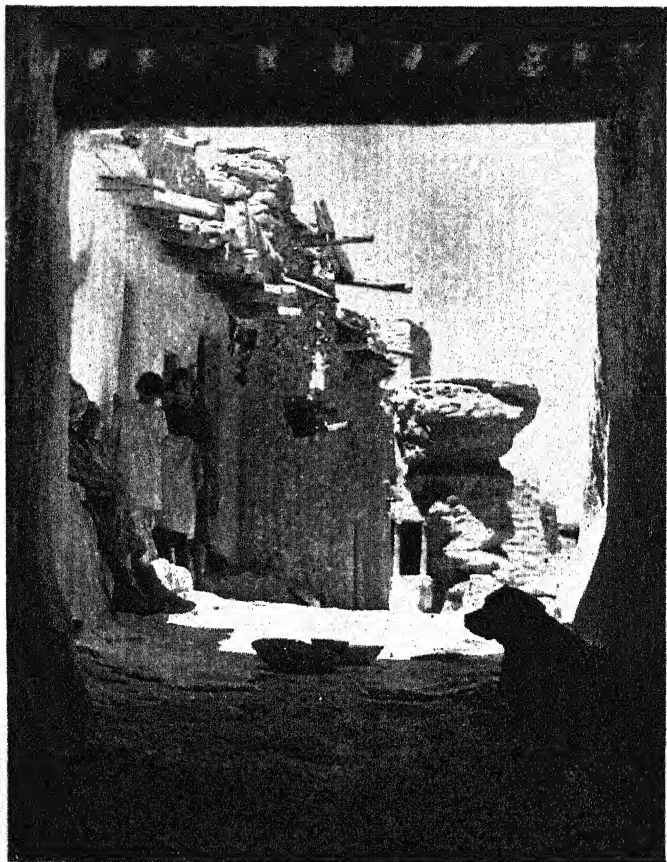
IN LUGANO

H. B. J. CRAMER



SUNSHINE ALLEY

G. L. HAWKINS



THE GUARDIAN OF WALPI

FRANKLIN I. JORDAN



STUDIO APPLIANCES.

Trolley for Small Studio Cameras.—A studio camera stand giving very easy adjustment of the camera height (especially for portraits of children), as well as mobility and provision for tilting, has been recommended by P. C. Smethurst as a very valuable addition to studio equipment.

As shown in fig. 1, the camera is supported on a platform or table hinged at one end, and bored for the camera screw centrally, and having at the unhinged end a quick-thread screw, e.g., one of those screws used for opening windows with a cord. This screw will tilt the platform one way only, so that if the camera is needed to tip the other way it must be reversed on the platform. The wooden body to which the platform is hinged has a leg underneath it, and a piece of strap-iron at the far side of the camera platform, which latter passes round—and fits accurately—a two-inch post supported on a triangular base.

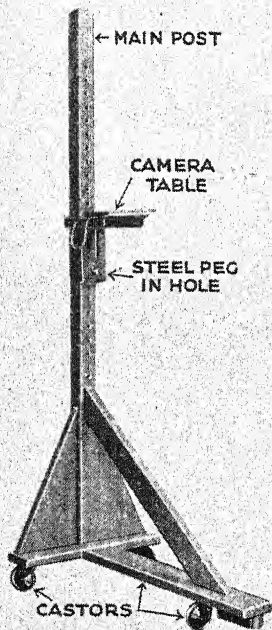


Fig. 1.

the wooden body fits into these neatly. Thus when the

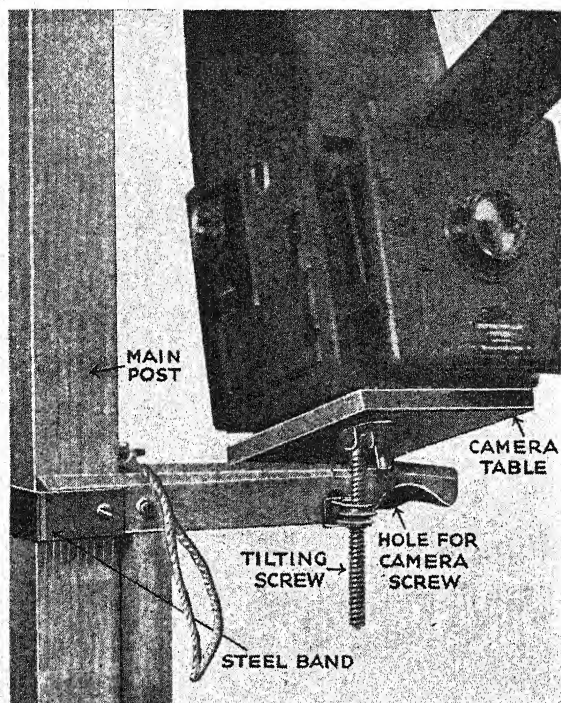


Fig. 2.

camera needs to be lowered or raised without tilting, it is lifted until the steel pin comes out of the hold, the camera, platform and wooden body moved to the position required, and the steel pin put into the nearest hole. To permit this, the wooden body is cut away under the strap-iron.

This arrangement requires reversal of the camera to change from tipping forwards to tipping backwards (fig. 2). This could also be altered by carrying the camera platform on a central pivot on the wooden body, but would introduce an extra cost. It is a simple matter to unscrew the camera half a turn and reverse it, and then to turn the whole trolley round.

As regards the base, the following dimensions are suitable for a half-plate camera:—Triangular base of stand: base of triangle, 2 ft., height (from post) of triangle, 2 ft. 6 ins.

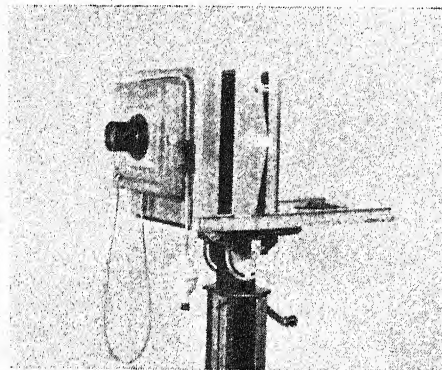
Post: 2×2 ins., height 5 ft. from floor. Unless very good castors are fitted, it may be found necessary to screw pieces of lead on the base, to avoid play and consequent camera "flutter" during exposure.—B.J., 1932, April 29, pp. 255.

Studio Lens-Hood.—A lens-hood for studio use designed by K. Reitz was produced to meet a number of requirements not met by the patterns available commercially, viz., it

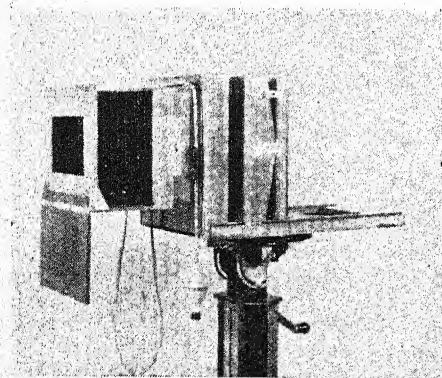
must be adjustable in length for use with any lens from 6 to 20 ins. focus, it must be quickly detachable for changing lenses and it must cut out all stray light even when working with spotlights almost facing the camera.

Figs. 1, 2 and 3 show the lens-hood, made by Messrs. Gandolfi, which has proved a very satisfactory solution of this problem.

Fig. 1 shows a whole-plate studio camera (without the hood attached), the sliding lens board of which is fitted with a shallow box containing a Packard Studio shutter. All the lens panels are of uniform size and fit into this box attachment, being secured with turn buttons. At the side of this box will be noticed a milled screw, and on the opposite side



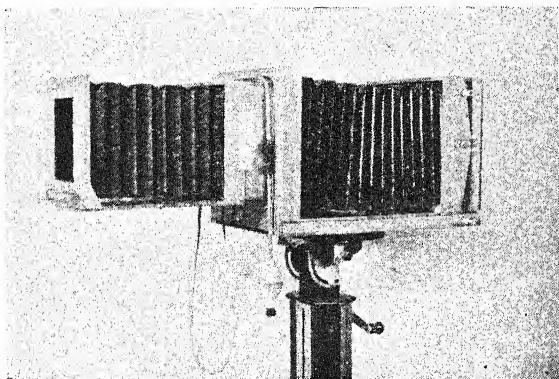
No. 1.



No. 2.

(not visible) is a similar one. On the back frame of the hood itself are two brass plates, one on each side, with slots cut out of them. When the hood is put into position against the camera, these slots engage with the milled screws which are then tightened to hold the hood firmly.

Fig. 2 shows the hood in use with a lens of about 8 ins. focal length. For this purpose half the baseboard on which the hood extends is dropped, thus obviating any cut-off of the picture. It will be seen that the panel in front of the hood is landscape way in this picture, whereas in the following one



No. 3.

it is upright. The panel, being square, is thus easily changed from one to the other. This panel is the most important part of the hood, as it enables one to cut out all stray light with the most gratifying results. If the length of hood is properly adjusted you will never get a dark edge round your negative.

In fig. 3, the hood is shown fully extended for use with lenses from 14 to 20 ins. focus, its full extension being 12 ins. It is absolutely firm at this extension.—B.J., 1932, Feb. 5, pp. 75.

The Art of Portraiture.—The unique experience of Mr. Herbert Lambert, managing director of Elliott and Fry, Ltd., is embodied in his treatise "Studio Portrait Lighting." This book contains reproductions, each accompanied by a diagram of the lighting. The book deals almost entirely with portraiture by electric light. (Henry Greenwood & Co., Ltd., 24, Wellington Street, Strand, London, W.C. 15s. net; postage 6d.)

WEDDINGS AND CHILDREN.

Tactics in Wedding Groups.—L. T. Woods describes how a professional photographer is accustomed to outwit the amateurs who take their own snaps of a wedding group which he has arranged. The arrangement of the group is postponed to the latest stage of the proceedings so that most of the guests will have used up the film in their cameras. Also, the shadiest part of the grounds is chosen in which to arrange the group, with the result that the "snaps" of guests are almost certainly so under-exposed as to be useless, whereas the professional is enabled to obtain a good negative with a short time exposure.—B.J., 1932, July 15, p 427.

Child Portraiture with a Reflex.—Describing his experiences in child portraiture, Mr. Douglas Hooper, a prominent professional photographer near London, expressed his preference for a reflex camera.

The apparatus which he had finally adopted was a 5 × 4 Graflex, with an 8½-in. *f*/4.5 Ross Xpres, used in conjunction with flat-film holders. As the slowest speed of the Graflex shutter proved too rapid, exposures were always made by first raising the mirror and then dropping the blind, thus giving an exposure from about ⅓-sec. upwards. The mirror had been found to work without vibration and without objectionable noise.

The focussing hood had been improved for studio use by adding nicely velveteed side-flaps, to prevent reflections from the operator's spectacles. For easier viewing of the image a large reading glass (with the handle removed), just big enough to be comfortably within the hood, was fixed above the ground-glass, resting on a framework of suitable height. The camera was invariably used on a Korona stand, either a standard model or one cut down for low-view point pictures. The old-fashioned warbling bird had been found well worth using and was mounted on top of the lens-hood of the camera.

His studio, decorated in a way to appeal to children, was illuminated mainly by daylight, but with a Kettle studio lamp as supplementary light-source. Very translucent, pale blue Japanese silk, stretched on a frame in front of the lamp, made this electric lighting much more restful. A Kodak "Restlight" was also available for adding extra sparkle, and another lamp with Barkay reflector, on top of the background, had proved of use in lighting up the hair. In the usual way, ordinary flat-films were used in preference to panchromatic. Any tendency of these films to bulge outwards

in the centre can be prevented by bending the pack of films to a reverse curvature, wrapping with paper, tying round with a string and placing for an hour or so in a light-tight box.—B.J., 1932, Jan. 22, pp. 54-55.

FLASHLIGHT PHOTOGRAPHY.

Firing Flashpowder Electrically.—From experience in flashlight photography in steelworks and other heavy industrial works, C. H. Cleveland recommends electric fuse ignition from the main supply on account of its reliability, in preference to either fuse ignition by dry battery or spark ignition by means of a coil.

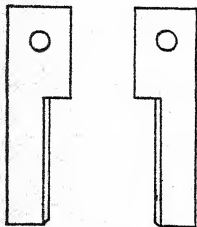


Fig. 5.

Flash-trays designed for ignition in this way—simultaneously, if desired—are illustrated. They can be placed wherever they may be needed and are fired electrically by means of a switch held in the hands. The electric circuit is represented in fig 1. A shows a length of twin flexible wire with an L.B.C. lamp plug at one end and a lamp holder at the other. This flex should be at least 30 ft. long. Another plug B is wired to the resistance C and switch D from which more flex is run,

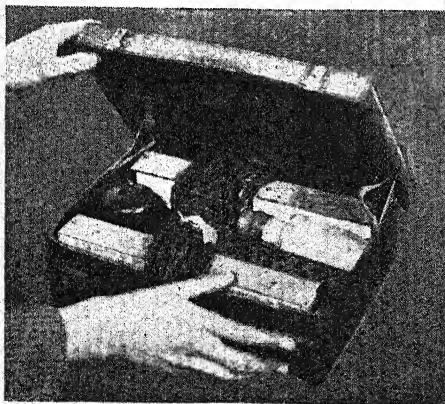


Fig. 6.

in parallel, to each of the flash trays, E and F, each of which has a light fuse of tinfoil. The resistance is required to reduce the flow of current, since too much current is likely to blow the fuses at the distribution box in the building. As a rule at least 250 watts can safely be drawn from any lighting point. The resistance may consist of 35 double turns of 30g. "Nichrome" wire—a heating element

wire—around a helically grooved porcelain rod, one inch in diameter, held in clips on a slate base with a perforated metal cover. Any similar compact resistance will answer the purpose. The resistance must be arranged so that it will do no damage if the current should continue to flow at any time accidentally. The switch can be a light hand switch of the pear type, but a 5 amp. quick-break tumbler switch or a 10 amp. ordinary tumbler switch is to be preferred.

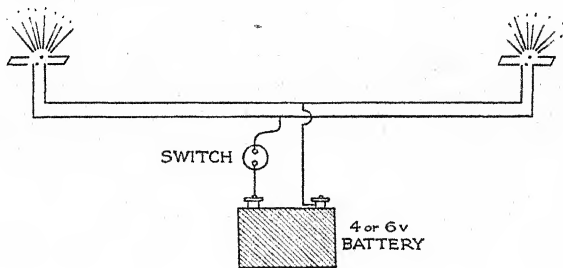


Fig. 7.

Figs. 2, 3 and 4 show the construction of the flash trays. The wooden base A of the tray (fig. 4) is fitted with a brass socket F for the tripod screw. B is a fireproof facing of ordinary asbestos board. The two terminals C.C. in the centre are fixed with centres 1 in. apart, and are soldered to strips of brass let into the wood and allowed to project for outside terminals to be fixed. The centre terminals C.C. hold strips of brass, flush with the asbestos board. These strips are bent up about $\frac{3}{32}$ in. to form "knife edges" (fig. 5). Plates of aluminium E.E. are screwed to the base to form the sides of the flash tray. Two light tripods complete the outfit, which is seen in fig. 6 packed in a small attaché case. A number of fuses— $\frac{3}{16} \times 1\frac{1}{4}$ in. strips cut from the thinnest tinfoil—are kept in a small box.

In use, one of the fuse strips is laid over the knife edges, first making sure these are clean by rubbing with a piece of emery cloth, which may be attached to the tray with a cord, to make sure it is always handy.

The flash-powder is now spread over the fuse and as far on each side along the tray as necessary. The plug B acts as a safeguard; it is only connected when all is ready.

The action can be tested without using any flash-powder at all: the light fuses go off with just a sharp click.

Fig. 7 shows the modification for use with a 4 or 6 volt battery, in place of electric mains. The difference here is

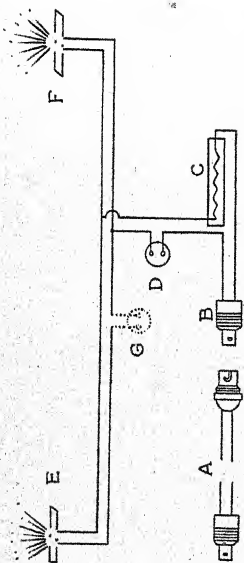


Fig. 1.

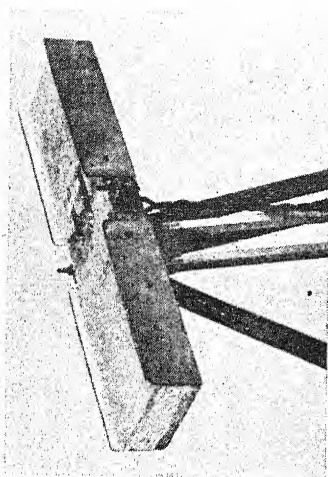


Fig. 2.

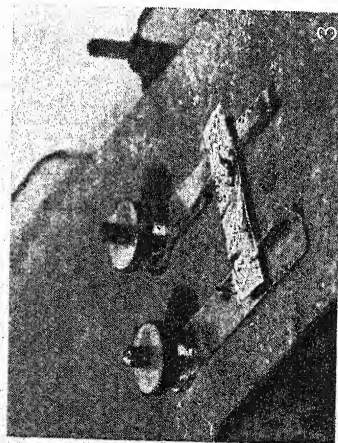


Fig. 3.

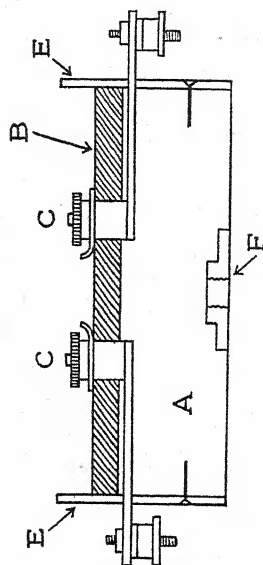


Fig. 4.

that two thin copper fuses of ordinary tinned copper fuse wire (about 38g.) are used in place of the fig. 5 contacts. This is easy to re-set; all one has to do is to loosen the terminals and insert a new wire, which is very little trouble. The parallel leads to each flash point must be of equal length, or one flash will fire before the other. Fairly heavy flexible leads, like the kind used for a small electric fire, are required. Also the two fuses must be of equal length, making almost a straight line between the terminals.

The apparatus may be arranged to work the two flashes in rapid succession, instead of simultaneously, by inserting an additional switch in one of the wires to one of the trays, for instance, at G (fig. 1). The additional switch is left open. When all is ready the switch D will fire tray F alone, then without further alteration the additional switch G will fire tray E.—B.J., 1931, Oct. 30, pp. 647-649.

Flash-bulb and Shutter Synchronised.—A means of mounting an electric flash-bulb on a camera and synchronising its ignition with the operation of the shutter has been patented by Alexander Steward.

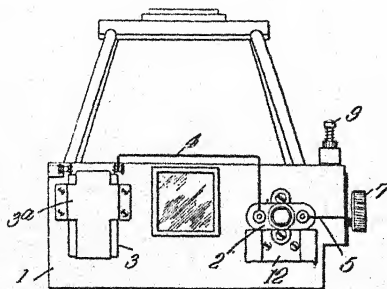


Fig. 1.

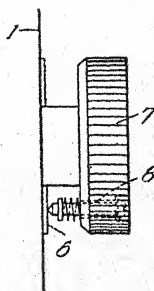


Fig. 3.

In the drawings, fig. 1 shows the camera fitted with the lamp socket. Fig. 2 is a side view of the camera showing the flash bulb in position, the winding key of the shutter being omitted for the sake of clearness. Fig. 3 shows the make-and-break device.

The camera 1 is provided with the lamp socket 2 and an electric battery 3, the latter being mounted thereon by a clip 3a. One terminal of the lamp socket 2 is electrically connected with the battery 3 by a wire 4, whilst its other

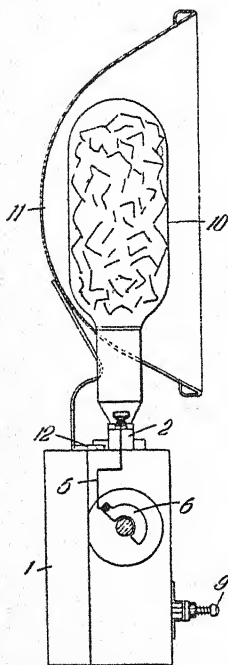


Fig. 2.

terminal is connected by a wire 5 with a copper segment 6, mounted on one of the vertical faces of the camera. The knob 7 which is provided for winding up the shutter of the camera 1 is fitted with an electrically conducting stud or screw 8 which, during a predetermined part of one revolution of the knob 7, is spring-pressed against and travels over the copper segment 6 to complete the flash-lamp circuit. The camera is provided with the usual release 9.

In fig. 2, the lamp socket is shown at 2, the lamp having a reflector 11 mounted on a bracket 12.

In use, the knob 7 is rotated to wind up the blind ready for taking the photograph, and the lamp 10 and reflector 11 are then mounted in the socket 2 and bracket 12 respectively. The release 9 is then pressed, whereupon the rotation of the knob 7 together with its stud or screw 8 completes the battery circuit to operate the flash lamp as the slit in the blind uncovers the plate or film. In addition a device may be provided to ensure that firing of the bulb cannot occur when the shutter is being wound preparatory to making an exposure.—Eng. Pat. No. 363,050 of 1930.—B.J., 1932, Feb. 19, 9. 110.

Commercial Photography.—A text-book which deals with the most modern methods of photography for commercial purposes is "Commercial Photography," by David Charles well known as the originator of many methods, and also as a writer with the gift of making himself understood. (Henry Greenwood & Co., Ltd., 24, Wellington Street, Strand, London, W.C. 2. 5s., postage 5d.)

Retouching and Colouring.—A new edition has recently appeared of the manual, "Retouching and Finishing" by J. Spencer Adamson. This text-book is the most complete and up-to-date means of self-instruction in the retouching of negatives with pencil, knife, etc., and working-up and colouring of prints. (Henry Greenwood & Co., Ltd., 4s. net, postage, 5d.)

NIGHT PHOTOGRAPHY.

Photographing Floodlit Buildings.—D. Charles has pointed out that many good lenses are unsuitable for night subjects in which bright sources of light are present on account of their throwing ghost images or flare spots, or a general veil of light over the image. A lens of maximum aperture not greater than $f/8$ will often be found better than expensive lenses for this type of work.

Over-development spoils many negatives of night subjects, by the clogging up of the high-lights. For this reason, and for the avoidance of halation, Press plates should be avoided, in favour of one with a softer, denser emulsion. Ultra-rapid studio plates or soft-gradation panchromatic plates are specially suitable. . . . Owing to the large amount of undeveloped emulsion, it is important to rinse the negatives very thoroughly before fixing and to leave them fixing in the dark longer than usual before white light is admitted.

In printing, special care should be taken to keep the developer continually in movement, to rinse well and to keep the print well on the move for the first few minutes in the fixing bath. When prints are made by enlargement the presence of large clear areas in the negative may lead to general veil over the picture by the enlarging lens; with the fogging that occurs with some lenses it is impossible to obtain clean whites, even though the detail in the high-lights may not have been printed through. This degrading of the image rarely occurs with a diffused-light enlarger, or with a condenser enlarger in which a sheet of flashed opal is placed between the condenser and the lamp.

If an over-developed negative is reduced (with persulphate) it will be found difficult to reduce sufficiently and yet retain definite points of high-light. But points of pure white are essential in these prints to give proper brilliance, and it is therefore best to reduce partially, very cautiously, and then intensify the less developed details locally. Local reduction is, however, not to be attempted: its effect is to remove locally a very slight and unsuspected veil, giving absolutely clear gelatine round the reduced high-light. This gives a patch of denser black in the print, and the irregularity is very difficult to remove. For these reasons development to correct density in the first place is much more desirable in negatives of night subjects than in general work.—B.J., 1931, Dec. 4, pp. 723-724.

Camera for Night Photography.—A camera suitable for commercial work in the photography of night subjects and made at small expense from materials that happened to be at hand has been described by J. H. Cleet.

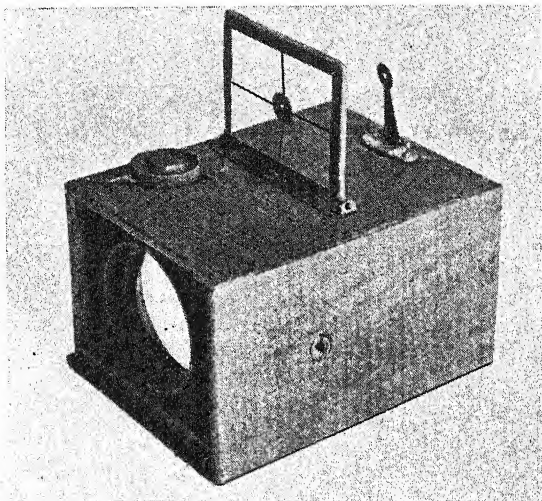


Fig. 1.

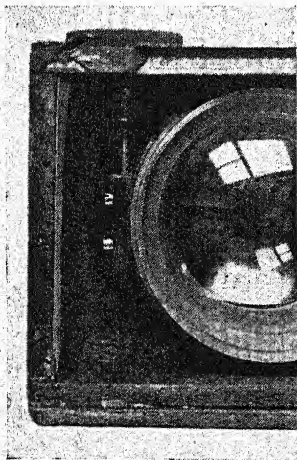


Fig. 2.

The lens was an old Darlot of $2\frac{1}{4}$ ins. focal length and about $f/2$ aperture, fitted with rack and pinion focussing. To make the camera as unobtrusive as possible in use its design was kept simple and the working parts few in number. Dark-slides and focussing screen of vest-pocket size were available from another camera, so that the problem was reduced to the making of the camera body and the addition of the necessary fittings, such as a simple flap shutter and an additional sector "Luc" shutter.

The camera body (fig. 1) was

made of ply-wood in box form, with the lens panel fitted within the box at the correct distance for sharp focus on distant objects. Focussing is done by turning the pinion which is carried through (fig. 2) to the top of the body. Fig. 3 is a view looking down on the top of the camera, and shows the pointer soldered to the pinion head and working over a scale of distances drawn by hand on thin card and then varnished and covered with cellophane. Fig. 3 also shows the top of the flap pivoted on

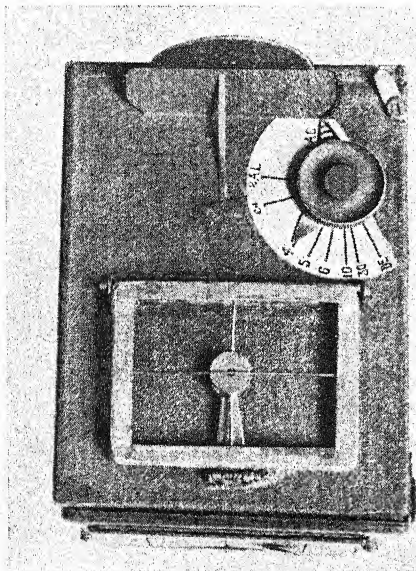


Fig. 3.

the camera front so as to serve as a shutter when required. In this raised position (for exposure) the flap is held up by the turn-piece seen in the top right-hand corner. It was found that the slit necessary for the movement of the exposure flap passed light and was liable to cause fog on the plate. For this reason a light-trap was fitted, as shown in fig. 3, where it is seen pressed in place with a strip of very thin watch-spring which allows it to move up when the flap

is raised and presses it down again as the flap is lowered.

Fig. 4 shows the camera with the front removed for cleaning the lens and also shows the arrangement of the flap. This latter is mounted on the inside of the front, and is of aluminium, shaped to cover the aperture. Its working is governed by the coiled watch-spring, and the flap is operated by pressing on the protruding knob.

As already stated the flap is a most useful part of the camera, as it serves for the intermittent exposures, working silently and with scarcely a trace of vibration.

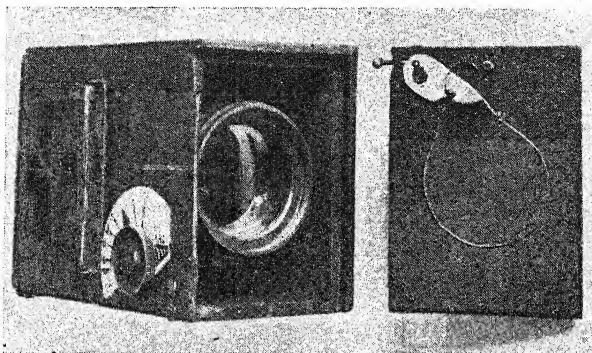


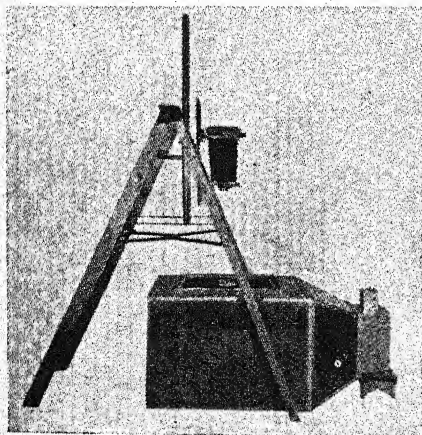
Fig. 4.

For fitting the camera with the Luc shutter, a lens hood of ample dimensions is clipped to the front and the shutter mounted on it. The hood is an attachment of great importance when working with a lens of extreme aperture and with subjects which include naked lights.—B.J., 1932, April 1, pp. 195-197.

FOR TRANSPARENT SUBJECTS.

Photographing Plants etc., by Transmitted Light.—A method and apparatus for illuminating objects such as parts of plants, specimens contained in glass trays, etc., by

transmitted light, photographing them in a horizontal position by means of a vertical camera, are described by L.P. Flory.



The apparatus, as illustrated, consists of an aluminium illuminating box, 48 ins. long, 28 ins. wide, and 25 ins. high, the top of which is hinged to give access to the interior. The inside contains a reflector R set at an angle of

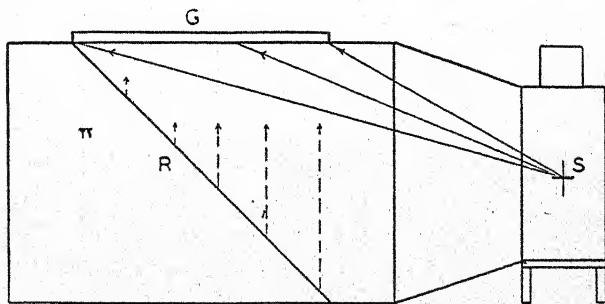
45 degs., which may be covered either with white paper or black velvet, according to the background required. The opening at the top of the box is 16×20 ins. and is covered with plate glass to support the object.

The light-source is placed at the open end of the box and consists of a 1,000 watt half-watt lamp in a metal reflector.

A vertical stand carries a rod operated by a rack and pinion which enables the distance between the camera and the object to be varied.

Most plant material may be photographed in air, but some delicate root systems and aquatic plants must be kept immersed in water. A shallow aquarium is provided for this purpose. The glass plate under the top of the box is removed and the aquarium placed over the opening.

Plate cultures are usually photographed against a black background. In order to prevent excess light from reaching the lens of the camera a metal diaphragm is placed over the opening in the top of the box. This diaphragm has an opening in its centre, which is slightly smaller in diameter than the culture dish which is placed upon it. The diaphragm confines the transmitted light to the area of the dish.



Besides light reflected from the surface R there are also direct rays from the lamp S, which strike the object plane G obliquely. When the surface R is covered with black velvet, for a black background, this direct oblique light furnishes the greater part of the illumination. The amount of light reflected from the surface of the velvet is negligible. This direct oblique light furnishes relief lighting to any object of appreciable thickness. The reflecting surface R is located at a sufficient distance from the object plane G so that the background and

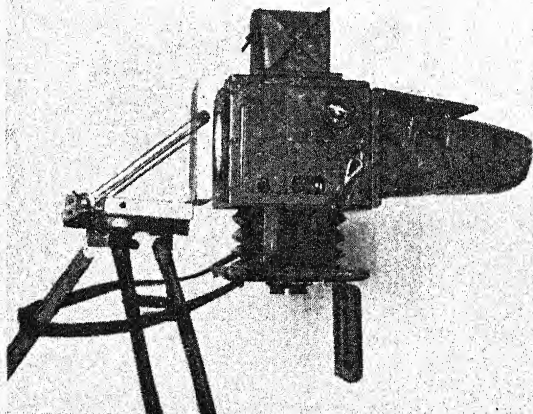
the object will not be in focus at the same time. The negative, therefore, will not register any detail in the background itself.

It is often necessary to photograph opaque objects in a horizontal position, without showing the means of support and without shadows on a white background. The illuminating box is well adapted to such work. The object is placed on the plate glass. The transmitted light is turned on, and an exposure made for the background only. Then the transmitted light is turned off and the object photographed by incident light from above. If the proper balance is obtained between the exposure for the background and the exposure for the object, the result will show perfect detail in the object and the background will be free from shadows. This method eliminates opaquing the background, which in many cases would be most difficult.—*Amer. Phot.*, 1932, May, pp. 208-212.—*B.J.*, 1932, May 27, p. 321.

A UNIVERSAL TRIPOD TOP.

A Tilting Table.—A method of making a tilting table (see photograph) which will allow the camera to be inclined at any angle up to and including the vertical position, for photographing small objects, has been described by E.H.T.

A piece of mahogany or baywood is trued up to size 10 ins. by 4½ ins. a mark being made across the centre on each side. A circular piece of similar material ¾ ins. thick and 3 ins. in diameter is now cut and is screwed down to the centre of



one-half of the marked board, thus forming a small table-top.

Two brass bushes $\frac{1}{8}$ in. thick and $1\frac{1}{2}$ ins. diam. with a $\frac{1}{4}$ in. Whitworth thread in the centre of each may be obtained from any shop in possession of a lathe, and these are screwed down in the centres of each half of the board to take screws for holding the board to the tripod and camera to board.

At a point $\frac{3}{4}$ in. from the end of the board a hole is drilled through the entire width of the material, this being done by drilling from each side with a $\frac{1}{4}$ -in. drill until the hole meets in the centre, when it may be opened up either with a round file or a thin hot poker. A $\frac{3}{4}$ -in. bolt with a wing-nut $5\frac{1}{4}$ ins. long is obtained to fit the hole.

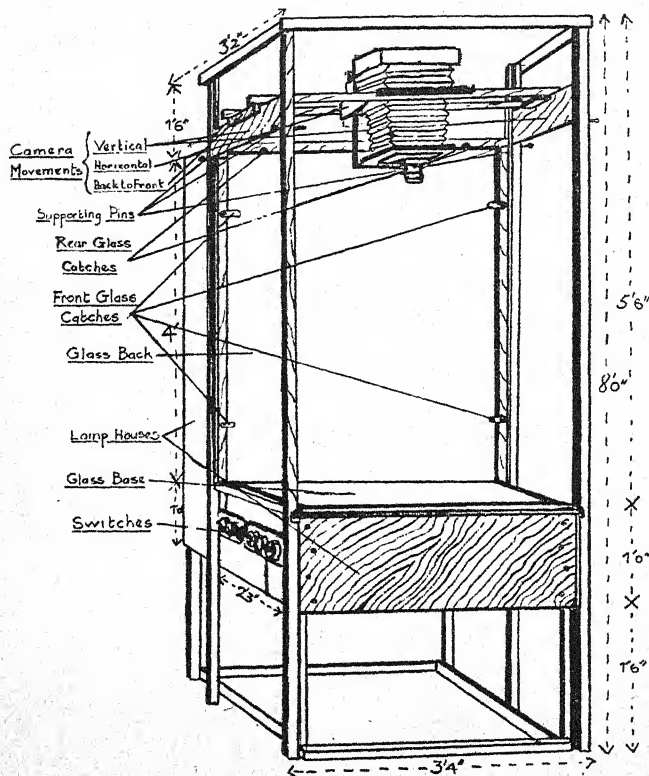
Two brass stays are now made from $\frac{1}{2}$ in. by $\frac{1}{16}$ in. strip brass, the centre portion being drilled out and the inside grooves then filed smooth, and two brass plates are also made to be screwed on each side of the long drilled hole, in order to prevent crushing the wood when the wing-nut is tightened up.

Either one $4\frac{1}{2}$ in. or two 2 in. hinges are obtained which are screwed upon the centre line of the board. They are then removed and the board is sawn in half, after which they are again replaced. One end of each of the brass stays is now screwed to the end of the board remote from the long bolt, and the other ends are secured by means of the bolt.—B.J., 1932 May 6, p. 283.

IN COMMERCIAL PHOTOGRAPHY.

A Multi-Purpose Apparatus.—L. G. Sandys has described a piece of apparatus (illustrated) which renders possible the taking of photographs of small or large objects from above, viz., from a standpoint directly or obliquely overhead. Shadows may be eliminated by the use of it, or reflections gained, and bases as well as backgrounds may be varied when desired.

Nine electric lamps are fitted in the base of the machine and another nine in the back. An object to be photographed is placed on the base of the machine and the usual floodlights, etc., arranged at the front and sides; these cast heavy shadows, which would spoil the effect for a good many subjects, especially if they were for catalogue work. Then the whole eighteen (or lesser number, as required) lamps are switched on, and the shadows disappear; blocking-out is thus automatically obviated. The light is sufficiently diffused to prevent halation.



Striking reflections can be secured of any object being photographed, and to any degree of brilliancy which may be desired, by means of varying the lighting below the glass base of the machine and the top lighting outside.

The base and the back of this piece of apparatus are each composed of two sheets of glass. First, a fairly thin sheet is inserted and on top of this is placed a sheet of good quality white paper, as grainless as possible, and then a sheet of plate-glass. This may seem an unnecessary expense, but the glass must be perfectly flawless or else the reflections will not be true.

The first thin sheet of glass is secured in place by four small catches; they are shown marked as "rear glass catches."

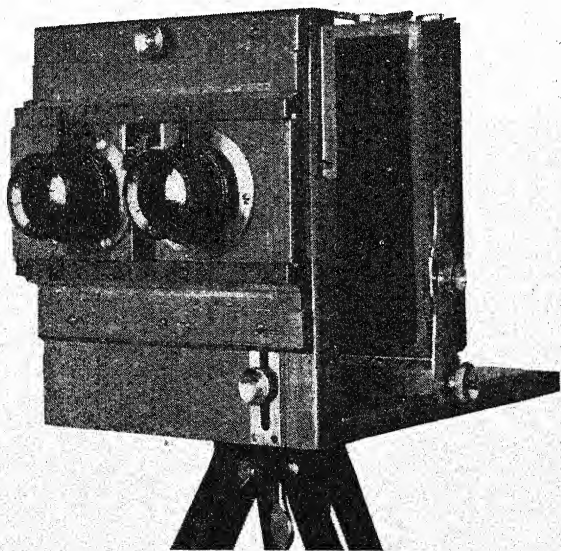
The front glass is secured in a similar manner, and is similarly described in the illustration.

It is in connection with these sheets of glass that the varied backgrounds are obtained. If a background or base is desired other than white, then the sheets of white paper are removed by moving the front sheet of glass away slightly from the back one, and another sheet of paper of the required design is inserted.—B.J., 1932, May 20, pp. 304-307.

Commercial Stereoscopic Photography.—The use of small stereoscopic pictures as an aid to advertising is a comparatively recent development, and R. B. Willcock has described apparatus suitable for obtaining such pictures of a size which may be conveniently used with a cheap form of stereo-viewer, viz., the "Camerascope."

The outfit consists of a converted 9×12 cm. square-bellows camera, the lens-panel of which is so modified that it accommodates two lenses and provides for a reasonable amount of lens separation, i.e., $2\frac{1}{4}$ to $3\frac{1}{2}$ ins.

The adjustment of this dividing panel is controlled by a right and left hand threaded carriage-coupling screw, which is clearly shown in the photograph. A self-adjusting septum,



or dividing partition, is fitted centrally inside the camera, which confines each image to its respective side of the plate. To facilitate rapid exposures, a detachable double shutter is used ; in this, both sets of blades are operated simultaneously by a single cable release. The camera illustrated is fitted with a pair of finely matched $f/4.5$ anastigmat lenses of 12.5 cm. focus, also a pair of specially corrected supplementary lenses which reduce the focal length to 9.5 cm.

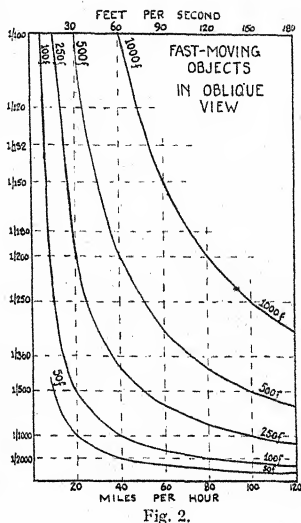
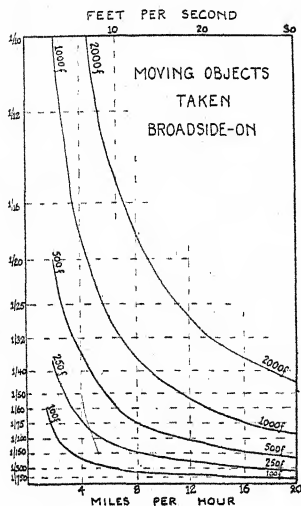
One of the essentials connected with the production of stereo photographs for advertising purposes is that a viewer must be supplied to the customer with the pictures, and they must, therefore, be of such a size that they are capable of fitting a cheap form of viewer. This difficulty is met with the apparatus described, for the results are suitable for viewing with one or other of the cheap commercial viewers which are supplied for the examination of stereoscopic pictures which are included in packets of a certain brand of cigarettes.—B.J., 1932, June 24, pp. 380-382.

A GUIDE TO SHUTTER EXPOSURES.

Shutter Speeds for Moving Objects.—As a more convenient and practical alternative to the usual tables or formulæ for shutter speeds for moving objects, a chart has been described by G. F. Cross, suitable for use with cameras and lenses of all sizes, and giving the required shutter speed as directly as possible.

Two charts are reproduced, one (fig. 1) relating to moving objects taken broadside on, the other (fig. 2) to fast-moving objects taken obliquely, *i.e.*, at an angle of about 30° with the line of movement. In each case the chart has been based on the assumption that negatives will be required for enlargement, *e.g.*, to 3 diameters, and a small circle of confusion ($1/250$ th in.) has been adopted accordingly as the standard of definition.

Each chart contains a series of curves, each representing a distance which is defined as a multiple of the focal length of the lens in use. Thus with a Leica camera with 2-in. lens the curve "500f" applies to an object distance of 500×2 ins., or just over 80 ft. : with a 9×12 cm. camera with 6-in. lens this same curve applies to a distance of 500×6 ins., or 250 ft. At any distance the required shutter speed is read off from the appropriate curve by judging the speed of the object (in miles per hour or feet per second), picking out the cor-



responding value on the top or bottom scale of the chart, casting a line vertically to meet the distance curve and then sideways across the chart to the shutter speed scale (in fractions of a second) on the left of the chart.

If broadside views are attempted under conditions of speed to which the second chart applies, it is necessary to reduce the exposure to one-half that indicated by this chart as suitable for oblique angles.—B. J., March 25, pp. 182-183.

INTRUDERS BEWARE !

Photographing Intruders in Private Premises.—An ingenious application of the photo-electric cell has been made in the laboratories of the General Electric Co., Nela Park, Cleveland, U.S.A., in the designing of an apparatus by which the features of an intruder who makes his way into a private room are recorded by means of a flash.

A concealed camera is set up facing the doorway by which entrance would be made. It is suitably focussed, and is arranged to be operated by an electric trip device which simultaneously ignites a flash bulb of the Sashalite or Vacu-Blitz type. The trip device is under the control of a photo-electric cell, which comes into action as soon as an intruder

enters through the doorway and thus interrupts a beam of light.—B.J., 1932, Jan. 22, pp. 49-50.

EXPOSURES BY ARTIFICIAL LIGHT.

Estimating Artificial-light Exposures.—The Burroughs Wellcome exposure calculator has been ingeniously adapted by G. C. Cato for working out the exposures for subjects taken by artificial light.

The method is applicable to all subjects marked with an asterisk in Table A of the Burroughs Wellcome Diary (i.e., all interior subjects for which the exposure is given in minutes or fractions of a minute) and is equivalent to the "Standard Exposure" for artificial-light subjects given as a guide in the Diary.

The rule may be stated very simply thus :

Work out an "artificial light value" (V) from the following formula :

$$V = \frac{4 \cdot d^2}{p}$$

where d = distance from light to object

p = candle power of lamp

Then use the calculator in the ordinary way as for a daylight exposure for the same light-value and any of the subjects marked with an asterisk.

Taking the example given in the Diary :

Light—one incandescent gas or electric light (32 c.p.)

Distance—6 feet,

whence

$$V = \frac{4 \times 6^2}{32} = 4 \text{ (approximately)}$$

Plate—factor 1/6.

Subject—Still-life study of medium and light tones in small room with light wall paper.

Set the plate factor 1/6 opposite light-value 4 ; re-set for "light interiors" ("very dark near objects" on the disc) and read off the exposure 3 minutes opposite $f/8$.

By using the calculator automatic compensations are made for different plate speeds, subjects, and stops, and a single simple calculation covers different lamp intensities and distances.

It must be noted that for the purposes of daylight exposures a distinction is drawn between a studio and an ordinary room, the studio exposure naturally being much shorter. But in the case of artificial-light exposures the studio and room are

practically on a par with one another. Provided this is kept in mind the method may be extended to include all interior subjects, even such as are not marked with an asterisk, the exposure then, of course, being indicated in seconds or fractions thereof.—B.J., 1932, April 8, p. 219.

TWO USES FOR PROCESS PLATES.

Making Bright Copies.—When difficulty is found in making copy negatives which will give prints of sparkling quality, L. G. Sandys advises the use of process film, very fully exposed and then under-developed in dilute metol-hydroquinone developer. Black-and-white prints, sepia prints and faded yellow prints all give very successful copies by this means.—B.J., 1931, Dec. 25, pp. 776-777.

Photographing Misty Interiors.—Bright, clear photographs of foggy interior subjects may be made with greater ease on a process plate than on an ordinary rapid plate provided that the longer exposure involved can be given. Ample exposure, in fact, is necessary. An ordinary metol-hydroquinone developer (without bromide) should be used in place of the usual caustic-hydroquinone developer.—B.J., 1931, Nov. 20, pp. 689-690.

REFLEX COPYING.

Contrast in Reflex Copies.—A process which has been patented by the I. G. Farbenindustrie Akt-Ges makes use of an effect, which is specially of value in the making of copies by the Playertype reflex-printing method, in which a plate in contact with a line original is made to give a copy by means of an exposure from the back.

The process consists in using emulsions sensitised to the infra-red (having a sensitivity maximum between 700-800 μ) and exposing through a red filter which only transmits red and infra-red rays. In this way very contrasting images are obtained, specially suitable for obtaining clear, bright images in reflex copies.—Phot. Korresp., 1932, Feb., p. 32.

Printing Processes.—The most up-to-date manual is "Photographic Printing, Professional and Commercial," by R. R. Rawkins. A most complete hand-book on every stage in the commercial production of prints. (Henry Greenwood & Co., Ltd., 24, Wellington Street, Strand, London, W.C. 2. 3s. 6d.; postage 5d.)

FOR PLATES, FILMS & PAPERS.

Storing Sensitive Materials.—The danger of spoiling sensitive materials by storing them near freshly painted surfaces or wooden surfaces containing resinous matter has been pointed out by Dr. H. Plaumann. The turpentine present in oil paint and the resinous emanations from various woods have intense fogging action on photographic emulsions.

A preventive of this latter source of trouble is to give several coats of celluloid varnish. Or a cheaper method is to use the following solution :—

Copper chloride	...	...	75 gms.	1½ ozs.
Potass. chlorate	...	...	59 gms.	500 grs.
Water	...	...	1,000 c.c.s.	20 ozs.

The wood is saturated with this solution and is left to dry partially. Then the wood, still moist, is painted with a second solution :—

Aniline chlorhydrate	...	...	150 gms.	3 ozs.
Water	...	...	1,000 c.c.s.	20 ozs.

This gives a deep black finish, unaffected by water and very resistant to chemical action. When it has completely dried, the surface is thoroughly washed with water. For still greater security the same treatment can be repeated after this washing. Wood prepared in this way is free from harmful emanations and can be used for storing even the most sensitive photographic materials.—Phot. Indus., 1932, Jan. 6, pp. 5-6.—B.J., 1932, Feb. 26, pp. 121-122.

PLATE BACKING.

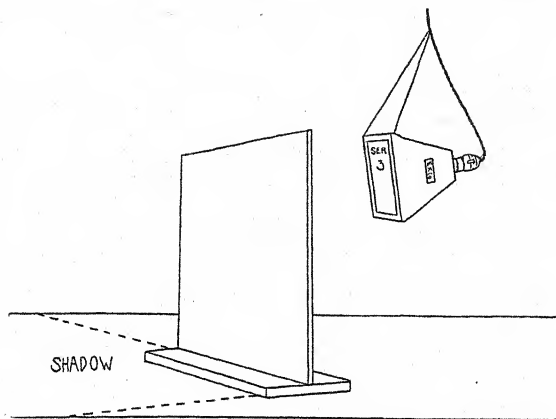
Backing for Plates.—A backing which is free from mess and dries quickly is advocated by Dr. A. Charriou, who states that it possesses sufficient anti-halation quality for most purposes.

The backing is prepared by mixing 25 parts of a 15 per cent. solution of aurine, 1 part of 10 per cent. solution of bleached shellac, and $\frac{1}{2}$ part of 10 per cent. caustic soda solution. All three solutions must be made with alcohol.

The mixture is filtered, and applied to the backs of the plates with an air-brush; it dries in about a minute. It is of such hardness that it does not fritter off through abrasion, and is of such transparency that plates may be inspected in the ordinary way during development by holding them up to the light. After fixing, all traces of the backing may be removed by slight rubbing with a pad soaked in spirit.—Le Photographe, 1932, May 5, p. 173.—B.J., 1932, May 18, p. 285.

DESENSITISING.

System in Pinacryptol Desensitising.—W. J. Nehs has described the system which he employs in developing commercial panchromatic and portrait panchromatic cut films, with preliminary desensitising with pinacryptol green.



The emptying or loading of film holders need not be done in complete darkness; it is quite satisfactory to work in the shadow of an opaque screen facing a safelight lamp, as shown in the figure. The lamp is fitted with an Eastman Series 3 green safelight. Ample light will be reflected round this screen and will be safe, since the direct light from the lamp is cut off.

The desensitiser is most cheaply purchased in powder form, in 1 gram lots. The stock solution is made by dissolving this amount of dye in 500 c.c.s. of distilled water. It is not sufficient to dissolve the powder in the cold water. A crop of small transparent spots on the negatives is to be expected from undissolved particles of dye unless the solution is boiled for a short time. The solution should be boiled up in a chemical flask and repeatedly whirled round to remove particles of solid that may be left by froth on the sides of the beaker. The solution is then cooled and transferred to a dark bottle for storing. The solution will keep for years in the dark.

The working solution is prepared by adding 1 part of the stock solution to 9 parts of distilled water. In this preliminary bath films are treated for from two to three minutes.

The working bath, which is used repeatedly, may be kept up to volume and strength by occasional additions of distilled water and stock solution. To hinder the growth of moulds formaline should be added to the working bath, to the amount of 1 c.c. per 500 c.c.s. of the bath.

On account of the gradual accumulation of particles of gelatine and other foreign matter in the working solution it is preferable to keep the working desensitiser in a hard rubber fixing tank and hang the films in the solution by means of clips and Monel rods. The tank should have a well-fitting cover when not in use, and should at all times be kept secure from splashes of developer or hypo. With such a deep container foreign matter settles at the bottom and does no harm, so that the liquid need only occasionally be filtered. If a dish is used, one should filter the liquid each time it is used.

The desensitising is carried out, like the loading of the film holders, in the shadow of the screen. After desensitising, films are transferred directly to the developer. At this point the green safelight may be switched out and in its place a second lamp used, fitted with a Wratten Series O safelight (for gaslight papers). The newer Series OA must, however, be avoided, as it is liable to produce fog. This lamp is used at a distance of 6 ft. from the developing dish, with the opaque screen close in front of the dish, and plenty of light is thus given for watching the progress of development. It is better to judge a film by looking at it than by holding it up to the light and looking through it.

Pinacryptol green does not work favourably with a hydroquinone developer or with certain pyro developers, including the "B.J." non-staining pyro-soda. Most other standard formulæ are quite suitable.—*Amer. Phot.*, 1931, Oct.—*B.J.*, 1931, Oct. 16, pp. 617-618.

Hydrosulphite Developer and Desensitiser.—Sodium hydrosulphite has been employed by A. Seyewetz to make a solution which develops and desensitises simultaneously. The active mixture, which has been marketed as the *Lumière Hydro-developer*, is prepared by mixing the following anhydrous chemicals in powdered form:—

Sodium hydrosulphite (about 80%)	100 gms.
Potass. bromide	35 gms.
Sodium bisulphite (60-62% SO ₂) ...	165 gms.

The mixture keeps fairly well, if stored in closed bottles to protect it from moisture. It dissolves easily in water and

gives a very energetic clean-working developer which at the same time has strong desensitising quality.

For developing negative emulsions and Autochromes a 12 per cent. solution of this mixture is used (viz., 50 grs. per oz.) The image appears slowly, but rapidly builds up the necessary contrast. In about a minute the sensitiveness of negative emulsions is reduced to about 1/20th or of Autochrome plates or films to 1/200th. For papers or transparencies a 10 per cent. solution is used, and sufficient desensitisation occurs in about 30 seconds.—Sci. Ind. Phot., 1931, No. 12, p. 456.

DEVELOPERS AND DEVELOPMENT.

Two-Bath Developer for Doubtful Exposures.—Dr. Paul Zeigler has recorded his success with a special two-bath developer, originally worked out by Joanovitch, for the development of negatives the exposure of which may or may not be correct. He describes it as specially good for film exposures taken on tour under varying lighting conditions.

Two dishes are employed, each containing one of the following solutions :—

A. Metol	5 gms.	44 grs.
Soda sulphite	100 gms.	2 ozs.
Hydroquinone	5 gms.	44 grs.
Water	1,000 c.c.s.	20 ozs.
B. Potass. carbonate	100 gms.	2 ozs.
Water	1,000 c.c.s.	20 ozs.

These two stock solutions keep well in closed bottles. They should be thrown away when used.

The exposed plate or film is first immersed in the Solution A for about 30 seconds. No change takes place, but the film absorbs developing agent. The plate or film is then drained and at once transferred to the Solution B, where it absorbs carbonate. It is left here again for the same period, during which time the image appears. If the density seems right the plate is well rinsed and transferred to the acid fixing bath. In this the density falls away considerably, so that this must be allowed for in developing.

If necessary, the plate that has been passed through both baths may be given further treatment (after well rinsing) in both baths again, until the desired density is acquired. However, experience may show that a particular variety of plate will give the desired result with 40 seconds' immersion (instead of 30 seconds) in each bath. The temperature should not be below 66° F. It is claimed that this method allows brilliant

negatives of even quality to be obtained with wide variations in exposure.—Camera (Lucerne), 1932, Feb., pp. 267-268.

M-Q. Formulæ for Negatives and Prints.—G. W. Pritchard has pointed out that, though some of the most popular metol-hydroquinone developers are used for negatives and for prints indiscriminately, the requirements of the two classes of material are quite different.

A negative emulsion needs an excess of sulphite to prevent chemical fog, whereas a positive emulsion is best developed with a solution containing an excess of carbonate in order to yield the best blacks. For negative-making the developer should contain sulphite and carbonate (both crystalline) in the proportion of at least 2:1; for positive emulsions the ratio should be reversed, for best results, to 1:2.

Universal Developer.		Developer for Plates.	Developer for Paper.
Metol ...	20 grs.	20 grs.	20 grs.
Hydroquinone...	60 grs.	60 grs.	60 grs.
Soda sulphite ...	1½ ozs.	2 ozs.	1 oz.
Soda carbonate	1½ ozs.	1 oz.	2 ozs.
Potass. bromide	5 grs.	5 grs.	5 grs.
Water to ...	20 ozs.	20 ozs.	20 ozs.

The above table shows a universal M-Q. formula (column 1) modified to suit negative emulsions (column 2) and printing papers (column 3).

For excessive contrast, further modification may be made by replacing the metol with the same weight of additional hydroquinone; and for extreme softness the hydroquinone may be similarly replaced by metol.—B.J., 1932, April 22, p. 240.

Development under Tropical Conditions.—As a remedy for the difficulties which are met with in the development of negatives at high temperatures (about 86-104° F.), the use of hexamethylene-tetramine has been patented by the Munich firm of Otto Perutz. A developing solution made by mixing this compound with ordinary metol-hydroquinone developer, in the proportion of 10-20 gms. to every 100 c.c.s. of the working bath, acts satisfactorily under these conditions, even in the case of emulsions which are not specially hardened in manufacture.—Phot. Korresp., 1932, February, p. 32.

Knapp System of Development.—P. C. Smethurst strongly endorses the value for under-exposed plates of the system of development devised by August Knapp, Perth, Western Australia (B.J. Almanac, 1932, p. 191).

The system consists of developing the plate or film in 5 stages, three times in developer, and twice in plain water, the times of immersion in developer increasing in the second and third immersions.

The developer recommended by Mr. Knapp works excellently. This is a solution of 2 grains amidol and 11 grains soda sulphite crystals in 1 ounce of water. If a stock solution of the sulphite is not kept for other developers, it is preferable to use half the quantity of anhydrous sodium sulphite, as this dissolves very much more quickly in cold water.

The Watkins tank (plates horizontal) is preferred. Plates are put in the loose rack, the tank filled with developer and the rack-full of plates quickly lowered into the solution. With Ilford Special Rapid panchromatic plates and above developer, the successive immersions in the developer are 40, 50 and 90 seconds; in cold weather the last immersion may be as long as 160 seconds. With Ilford Soft Gradation pan plates, which are slower in development, suitable times are 1, 1½ and 3 minutes in warm weather; or 1½, 2 and 4 minutes if developer is cold, in winter. The intermediate soaking in plain water should never be less than 2 minutes and may be 3 minutes in cold weather.—B.J., 1932, Aug. 12, pp. 483-484.

Anti-Airbell Developers.—I. G. Farbenindustrie Akt.-Ges. has patented the use of certain organic compounds for preventing the adherence of air-bubbles to the emulsion surface. These compounds, which are the sulphonic acids of castor oil or of alkylated aromatic bodies, thus act as preventives of the clear spots known as "air-bells."

The compounds may be used in the form of a separate bath before development. A solution suitable for this purpose is made by adding 0.5 gm. of castor oil sulphonic acid to 300 c.c.s. of water. The exposed plate or film is wetted in the liquid for ½-1 minute and then developed in one of the usual developers.

Or the compound may be included in the developer. For example, 2 gms. of para-aminophenol are dissolved in 100 c.c.s. of water. 6 gms. of dry sodium sulphite, 12 gms. of potassium carbonate, 0.3 gm. of sodium dibutyl-naphthalene- α -sulphonate

are dissolved in 200 c.c.s. of water. The solutions are mixed, and the plate or film is developed in the mixture as usual at about 65° F.—Eng. Pat. No. 365,317, of January 13, 1930.—B.J., 1932, March 4, p. 139.

FINE-GRAIN DEVELOPERS.

Improved Paraphenylene-diamine Developer.—The paraphenylene-diamine developer previously proposed by MM. Lumière and Seyewetz as a fine-grain developer has been subject to serious drawbacks, notably its exceedingly slow action, the low contrast which it gives and its liability to give dichroic fog, apart from the need for much longer exposures in the camera.

A new formula has been put forward by those same authors as very largely avoiding these drawbacks. The borax previously used as accelerator is replaced by tribasic sodium phosphate.

The developer consists of :—

Soda sulphite, anhyd. ...	60 gms.	525 grs.
Paraphenylene-diamine ...	10 gms.	90 grs.
Tribasic sodium phosphate (10 per cent. sol.) ...	20 c.c.s.	3¼ drs.
Potass. bromide, 10% sol. ...	10 c.c.s.	1½ drs.
Water	1,000 c.c.s.	20 ozs.

On account of the importance of the correct amount of tribasic sodium phosphate and the varying purity of samples of this compound, it is essential to use a grade of guaranteed purity or to estimate the actual content by titration.

Development in this solution takes about an hour at 63-65° F., and a vertical tank is suitable. The image produced is greyish, transparent, dichroic and free from appreciable veil. It is transformed into a normal kind of negative of increased density and free from dichroic appearance, by intensifying with chromium.

A curious feature of this developer is that various plates which ordinarily give coarse, medium and fine grain respectively all give the same sort of grain with this developer. The coarse-grain plates give greater fineness, the medium-grain plates show no advantage whilst the fine-grain of slow plates is coarsened.—Le Phot., 1932, Feb. 5, pp. 33-37.

[Paraphenylene-diamine should be used with caution by those susceptible to skin poisoning, since its effects are often of a most serious kind. Eds., R.J.A.]

Fine-grain Developers.—The following are formulæ for fine-grain developers, collected by a writer in the "British Journal of Photography" from the literature of this subject. :—

	Wellington.	Kodak.	Gevaert.
Metol	2 gms.	2 gms.	2 gms.
	(18 grs.)	(18 grs.)	(18 grs.)
Soda sulphite, anhyd.	10 gms.	100 gms.	100 gms.
	(90 grs.)	(2 ozs.)	(2 ozs.)
Hydroquinone ...	2 gms.	5 gms.	3 gms.
	(18 grs.)	(44 grs.)	(26 grs.)
Resorcin	—	—	2 gms.
			(18 grs.)
Borax	20 gms.	2 gms.	2 gms.
	(175 grs.)	(18 grs.)	(18 grs.)
Water	1,000 c.c.s.	1,000 c.c.s.	1,000 c.c.s.
	(20 ozs.)	(20 ozs.)	(20 ozs.)

The making-up of these developers is somewhat particular. With the Kodak developer the metol is first dissolved in a small amount of warm water (125° F.). A quarter of the sulphite is dissolved in a little hot water (160° F.), the hydroquinone at once dissolved, and the solution then added to the metol solution. The rest of the sulphite is dissolved in hot water, and the borax then dissolved in turn. This solution is then mixed with the solution of the developing agents, and cold water added to make up the specified volume.

A similar procedure is advised for the Gevaert developer. The metol is dissolved in a fifth the total volume of warm water (122° F.). Then a portion of the weighed sulphite, from a quarter to a half, is dissolved separately in an equal volume of water, to which the hydroquinone and resorcin are added in turn. The two solutions are then mixed. A third solution is made by dissolving the remaining sulphites and the borax in hot water (158° F.), about equal in volume to the previously mixed solution. When this third solution has completely cooled it is poured very slowly into the first solution, which is kept constantly stirred. The mixture of the two solutions is then quickly made up with water to the required volume.

Two American investigators, H. W. Morse and D. R. White, have, however, studied the behaviour of developers using borax as alkali, but metol alone as developing agent. More recently H. Cuisinier, in France, has recommended a plain metol-borax developer for general use. Another recent formula is of a fine-grain developer recommended by the Agfa Co. This is a metol developer containing an unusually small amount of carbonate.

	Morse and White.	Cuisinier.	Agfa.
Metol	2.5 gms. (22 grs.)	4 gms. (35 grs.)	4.5 gms. (40 grs.)
Soda sulphite, anhyd.	38 gms. ($\frac{3}{4}$ oz.)	150 gms. (3 ozs.)	85 gms. (745 grs.)
Borax	5 gms. (45 grs.)	2 gms. (18 grs.)	—
Soda carbonate, anhyd.	—	—	1.0 gm. (9 grs.)
Potass. bromide ...	—	—	0.5 gms. (5 grs.)
Water	1,000 c.c.s. (20 ozs.)	1,000 c.c.s. (20 ozs.)	1,000 c.c.s. (20 ozs.)

In the use of panchromatic cine-film for negative-making and printing by enlargement B. Leitner has found advantage, as regards fineness of grain in a metol-hydroquinone developer employing glycerine as a very mild accelerator. This developer calls for a full exposure of the film and is much slower than ordinary M.Q. developers.

Metol	10 gms.	90 grs.
Hydroquinone ...	2 gms.	18 grs.
Soda sulphite, anhyd.	100 gms.	2 ozs.
Potass. bromide ...	2 gms.	18 grs.
Glycerine	6 c.c.s.	60 minims.
Water, to make ...	1,000 c.c.s.	20 ozs.

For this same purpose—that of negative-making in still photography on cinema films—a pyro-metol fine-grain developer has recently been recommended on the Continent. This developer differs from those ordinarily used by the use of a less vigorous accelerator, viz. acetone.

A. Oxalic acid	0.4 gm.	18 grs.
Metol	4 gms.	175 grs.
Pyrogalllic acid ...	12 gms.	1 oz. 90 grs.
Potass. metabisulphite	1 gm.	44 grs.
Water	200 c.c.s.	20 ozs.
B. Soda sulphite, cryst. ...	48 gms.	5 $\frac{1}{2}$ ozs.
Water	168 c.c.s.	20 ozs.
C. Acetone	40 c.c.s.	4 ozs.
Water	200 c.c.s.	20 ozs.

The working solution is made by mixing 15 parts of each solution and adding 80 parts of water.—B.J., 1932, June 10, pp. 349-352.

SOME MEANS AGAINST MARKINGS.

Wiping Negatives.—A South Australian correspondent, Gordon Walker, who recommends using chamois leather for cleaning lenses and for wiping all negatives before setting to dry, advises washing the leather occasionally in clean, warm rain-water to which has been added a few drops of ammonia or a crystal of soda carbonate. The leather is afterwards washed in two or three changes of clean water. Whilst drying it should be slightly and gently stretched at intervals. This keeps it beautifully soft when dry. To keep the leather clean and free from grit it is kept in a wide-mouth bottle fitted with loose cork and an extra cover, such as a clean shallow tin or round cardboard box.—B.J., 1931, Dec. 18, p. 763.

Remedying Abraded Negatives.—For remedying glass negatives which have suffered abrasion of the gelatine, for example, during transit when improperly packed, O. J. Morris recommends first a thorough swabbing of the film under a stream of running water, to free the scratches from the dirt with which they are always clogged. After thorough drying, the plates are then given a perfectly even coating of a good hot varnish, such as Johnson's Dry Plate varnish.—B.J., 1932, April 1, p. 203.

Black Lines on Film Negatives.—"Developments" (organ of Master Photo Finishers of America) points out that black lines on film negatives may be caused by the operator when stripping off the paper from the roll of film. When doing this, the roll is often held by the operator in his left hand and the paper removed with the right hand. The upturned fingers of the left hand are underneath, and, unless care is taken, the ends of the fingers will come in contact with the sensitive side of the film, giving rise to scratches as the film is pulled off. Abrasion is most likely to be caused in this way by those whose finger nails are long.—B.J., 1932, July 29, p. 453.

Kodak, Ltd., recommend a method of handling which effectively prevents this trouble. If the bottom-weighted clip is placed on the film first, and then the film thrown sharply by the right hand, the weight of the reel will open the film to its full extent and allow the operator to catch the end of the film in the palm of the left hand with the sensitive side upwards. The paper is then detached from the No. 1 end of the film, the weighted clip already on the film is allowed to drop, and the No. 1 end of the film is inserted in the top clip.

The description of this method makes the operation sound complicated, but in actual practice it is simplicity itself. If the top clips are previously loaded on to rods ready to receive the films after this operation of loading the bottom clip first, it will be found that after a very short time an increased loading speed will be obtained in addition to the elimination of the "pencil mark" lines which were at one time common in roll-film development.—B.J., 1932, Aug. 12, p. 494.

Curing Matted Film Negatives.—Film negatives which are found to have acquired an irregular matting of the back surface during development, for example when treated in a tank in contact with the backing paper, are usually most easily cured by treatment with a film varnish. One suitable varnish is simply a solution of about 50 grs. of gum dammar in 1 oz. of benzole. Another is the familiar water varnish made by soaking about 1 oz. of shellac in 8 ozs. of a saturated solution of soda carbonate for 24 hours, pouring off the liquor and replacing it by an equal quantity of water, and then boiling the latter until the shellac dissolves. After a time this forms a bright solution, in which films are soaked for a minute or two and then hung up to dry.—B.J., 1931, Oct. 16, pp. 613-614.

TWO NEW REDUCERS.

Belitski Reducer.—In Paper No. 473, from Kodak Research Laboratories, J. I. Crabtree and L. E. Muehler give a new formula for the Belitski reducer. The improvement consists in the use of citric acid and soda citrate instead of oxalic acid, thus avoiding white deposits on negatives or transparencies when the tap water contains much lime.

Ferric chloride (crystals) ...	25 gms.	3½ ozs.
Potassium citrate ...	75 gms.	10 ozs.
Sodium sulphite (desiccated) ...	30 gms.	4 ozs.
Citric acid ...	20 gms.	2½ ozs.
Sodium thiosulphate ...	200 gms.	1 lb. 11 ozs.
Water to ...	1,000 c.c.s.	1 gallon.

Mix in the order given.

Use the solution at full strength for maximum rate of reduction. Treat the negative for 1 to 10 minutes at 65—70° F., according to the degree of reduction desired. Then wash thoroughly. If a slower action is desired dilute one part of the solution with one part of water. The reducer is very suitable for negatives, etc., of considerable density and contrast.—B. J., 1932, March 18, p. 169, and March 25, p. 186.

Ferric Sulphate Reducer.—For proportional reduction, viz., for reducing contrast in correctly exposed but over-developed negatives, J. I. Crabtree and L. E. Muehler have found that an acid solution of iron alum is the best bath, viz.:—

Ferric ammonium sulphate	15 gms.	2 ozs.
(ferric ammonium alum)		
Sulphuric acid (concentrated)	10 c.c.s.	1½ ozs.
Water to	1,000 c.c.s.	1 gallon.

When mixing, it is most important to add the acid to the water solution, and not vice versa.

Use the reducer solution full strength at 65—70° F., and wash the negative thoroughly both before and after reduction. The negative should not be left in contact with the air during reduction and washing, or stains will result. The reducer keeps indefinitely. Contamination with hypo decreases its keeping life.—B.J., 1932, March 18, p. 170, and March 25, p. 186.

INTENSIFICATION.

Silver Intensifier.—In Paper No. 473 from the Kodak Research Laboratories on intensifiers and reducers for cine films, J. I. Crabtree and L. E. Muehler give particulars of a new silver intensifier worked out by them. It is suitable for ordinary negatives and lantern slides and has the advantages of keeping clear for a considerable time when in use and of preserving the colour of the original image.

Stock Solution No. 1.

Silver nitrate	... ..	60 gms.	2 ozs.
Water to	... ..	1,000 c.c.s.	32 ozs.

Stock Solution No. 2.

Sodium sulphite (desiccated)	60 gms.	2 ozs.
Water to	1,000 c.c.s.	32 ozs.

Stock Solution No. 3.

Sodium thiosulphate (crystal)	105 gms.	3½ ozs.
Water to	1,000 c.c.s.	32 ozs.

Stock Solution No. 4.

Sodium sulphite (desiccated)	15 gms.	219 grs.
Elon (Metol)	24 gms.	351 grs.
Water to	3,000 c.c.s.	96 ozs.

The intensifier is prepared as follows: Slowly add one part of solution No. 2 to 1 part of solution No. 1, shaking or stirring to obtain thorough mixing. The white precipitate which appears is then dissolved by the addition of 1 part of solution No. 3. Allow the resulting solution to stand a few minutes until clear. Then add, with stirring, 3 parts of solution No. 4.

The intensifier is then ready for use, and the film should be treated immediately.

The degree of intensification obtained depends upon the time of treatment, which should not exceed 25 minutes. After intensification the film should be immersed and agitated for 2 minutes in a plain 30 per cent. hypo solution and then washed thoroughly.

The solution prepared as above is stable under ordinary conditions for 30 to 45 minutes before a precipitate of silver forms in the solution. This precipitate then tends to deposit on the high-lights of the positive image and produce fog.

A normal degree of intensification is obtained in from 10 to 25 minutes, so that usually it is desirable to use a fresh solution for each treatment if further intensification is required.—B.J., 1932, March 25, p. 186.

Pyrocatechin as Intensifier.—The brown colour of the image developed with a strongly staining pyrocatechin developer may be made use of in various ways, according to recommendations by R. Namias, for intensifying a negative.

It is sufficient, for the majority of cases, to convert the negative image into silver bromide, by treatment with the usual bleaching solution of potassium bromide and ferricyanide, and then to re-develop with a pyrocatechin developer containing caustic alkali but no sodium sulphite. A formula for such a developer is as follows :—

A. Pyrocatechin ...	...	5 gms.	44 grs.
Water ...	...	500 c.c.s.	10 ozs.
B. Caustic soda, pure ...	...	4 gms.	35 grs.
Water ...	...	500 c.c.s.	10 ozs.

The re-developed image is of brown colour, due to a combination of the silver deposit with a stain image produced by oxidation of the developer. Since this stain image is relatively opaque to actinic rays, the effect is to increase the printing opacity of the negative.

If a single treatment does not give sufficient increase in the printing quality it may be applied repeatedly, with further increase each time. In this way the contrast may be built up for printing purposes ; but with repeated treatments the image suffers in transparency and in cleanness.

This same pyrocatechin solution can also be used with advantage as the darkening bath in intensifying with mercuric chloride. It gives much more density than ammonia or a developer containing sulphite.—Le Phot., 1932, Feb. 20. p. 65.

Solid Uranium Intensifier.—A Belgium firm—the Union Chimique Belge Soc. Anon. of Brussels—has patented a new type of preparation of the uranium intensifier. Hitherto it has been the practice to keep the uranium salt and the potassium ferricyanide separate, since they react on contact. According to this patented method the uranium salt is coated with mineral particles such as do not react in the dry state with the uranium salt. For example, uranium nitrate may be given a coating of alkali sulphate or alum, by melting the uranium salt with the sulphate. The product so obtained is allowed to solidify and then crushed. It can then be mixed with potass. ferricyanide without a reaction occurring. The mixture will keep for a week or two freely exposed to air.

For example, 5 gms. of potash alum are melted with 1 gm. of uranium nitrate, and the product allowed to solidify and crushed. It is then mixed with 0.6 gm. of potass. ferricyanide and 1 gm. of tartaric acid. The mixture is stored in a closed bottle. This amount is sufficient to make 250 c.c.s. of intensifying solution, to treat from ten to twelve half-plate negatives.—Eng. Pat. No. 363,854 of 1931.—B.J., 1932, Jan. 29, p. 67.

Failures with the Chromium Intensifier.—Though one of the most practical methods of intensifying, the bichromate intensifier is liable to give stains or irregular patches of density. These are usually due to too long an immersion of the negative in the bleaching bath, or insufficient washing before development.

Stains arising from these causes can often be removed by the following treatment:—

The intensified negative is bleached in a solution made up immediately before use by mixing 1 part of 0.4 per cent. potass. permanganate solution with 2 parts of water and adding 1 part of 15 per cent. hydrochloric acid solution: this solution must be replaced by fresh as soon as it becomes cloudy. The negative is bleached until no black silver deposit can be seen when the plate is viewed from the back, and is then washed in several changes of water. The image is then re-developed in an amidol developer:—

Soda sulphite, anhyd.	...	3 gms.	130 grs.
Amidol	...	0.5 gms.	22 grs.
Boiled water, to make	...	100 c.c.s.	10 ozs.

The negative is left in this bath for about a quarter of an hour, washed in several changes and put to dry.—Le Phot., 1932, February 20, p. 65.

SOME BENEFIT FOR FOGGED NEGATIVES.

Improving Fogged Negatives.—A method of treatment recommended by H. Huber for remedying negatives that have been fogged in a leaky camera depends on the fact that this fog lies mainly at the surface of the emulsion. Its effect is therefore minimised if the image is bleached and then re-developed so that only the image deposits lying deeper in the film are retained.

As a preliminary the negative is re-fixed for several minutes in a fresh fixing bath and then washed for at least an hour in running water. The negative is then bleached in a mixture of 10 per cent. copper sulphate solution and 10 per cent. sodium chloride solution, mixed in equal proportions. This operation is carried out by weak artificial light or well away from the windows by daylight. Usually the image bleaches in less than three minutes, by which time no remaining black deposit should be visible at the back of the plate, but only the light grey image of silver chloride.

The bleached plate is rinsed for about three minutes and then re-developed by bright daylight or artificial light. Though any ordinary developer may be used, the best results are obtainable with an acid amidol developer, viz. :—

Soda sulphite, anhyd	...	30 gms.	260 grs.
Soda bisulphite	...	20 gms.	175 grs.
Amidol	...	6 gms.	50 grs.
Boiled water, to make	...	1,000 c.c.s.	20 ozs.

As the image develops up, the plate is kept under examination from the back. The success of the method lies in observing the moment at which the fog deposit just begins to become visible. At this point the plate is quickly rinsed, and the remaining silver chloride forming the fog deposit is dissolved out in a fresh fixing solution. If this point in the development is allowed to pass it is necessary to repeat the treatment. Washing and drying follow as usual.

In most cases a negative so treated remains strong and vigorous enough to give a good print on a hard paper by contact printing or enlarging. If necessary, however, any intensifying treatment may be applied to improve the negative.—*Phot. Rund.*, 1932, March, pp. 118—119.

(We would suggest that every negative which is to be treated by methods of this kind should first be used for the production of a positive transparency by contact printing—in case of accidents. For negatives which are greatly fogged a process plate or film is the most suitable material on which to make the transparency. Eds. B.J.A.).

POINTERS IN BROMIDE PRINTING.

Quality in Bromide Printing.—Commenting on the poor quality of many of the bromide prints made for exhibitions, R. R. Rawkins has pointed out a number of important factors that govern quality in bromide prints.

The first essential is the choice of a paper correct in its grade of contrast for the negative in question. It is impossible to print negatives varying in quality on one particular paper. Most chloro-bromide papers, for example, will not give prints of proper depth from thinly graded negatives.

The exposure should be such that the print is right with about two minutes' development in ordinary metol-hydroquinone developer. Prolonged development, as for example for the extra two minutes which is often recommended "for full quality," is not to be recommended, owing to the risk of fog.

In order that exposures shall be accurately timed the light should be so regulated that at least three seconds' exposure is needed.

Much deterioration of print quality occurs through fixing prints for too long a time. Some papers will not stand more than fifteen minutes in a normal fixing bath without showing such reduction.

But the chief fault in bromides is foggy high-lights, for which over-development is mostly responsible. Other causes of this veiling are an unsafe working light, a developer wrongly compounded or deficient in bromide, or bromide paper of inferior quality.—B.J., 1931, Dec. 11, pp. 735-736.

Developer for Bluish Blacks.—K. W. Woodward has recorded a case of greenish-black tones on development papers for which a remedy was found in the addition of a small quantity of potassium sulphocyanide to the standard (D—72) elon-hydroquinone developer:—

Elon (metol)	...	...	20.6 gms.	180 grs.
Soda sulphite	...	...	300 gms.	6 ozs.
Hydroquinone	...	...	80 gms.	700 grs.
Soda carbonate	...	...	450 gms.	9 ozs.
Potass. bromide	...	...	12.3 gms.	108 grs.
Potass. sulphocyanide	...	...	1.7—2.0 gms.	15—18 grs.
Water to make	...	...	6.4 litres	128 ozs.

The working developer is: above stock solution, 1 part; water, 2 parts.—B.J., 1932, March 4, p. 144.

Soft Prints from Hard Negatives.—The Sterry process for obtaining enlargements from excessively hard negatives consists, as is well known, in giving the bromide paper full enough exposure to print through the densest parts of the negative and treating it for a short time with a dilute bichromate solution before developing.

Though this process has long been known it has not hitherto been sufficiently systematised to be of much practical value. A contributor has, however, indicated a system which makes the process of practical service.

Test exposures are first made on the bromide paper, one for the correct exposure for the brightest, the other for the darkest parts of the print. The ratio of these two exposures—i.e., the factor by which the exposure for the shadows of the negative has to be multiplied to give the exposure to print through the high-lights—is thus ascertained. Suppose this factor to be $3\frac{1}{2}$.

The enlargement is first exposed, for the time found to be right for the high-light density. Then, the factor being $3\frac{1}{2}$, $3\frac{1}{2}$ c.c.s. of a 5 per cent. solution of potassium bichromate are measured out and made up to any convenient working volume, say 100 c.c.s. with water. The rule works out less simply with British measures, but the equivalents are given for those who prefer the latter:—

Potass. bichromate 5% sol.	$3\frac{1}{2}$ c.c.s.	$5\frac{1}{2}$ drams.
Water	100 c.c.s.	20 ozs.

The print is bathed in this solution for $2\frac{1}{2}$ minutes, washed for 2 to 3 minutes and then developed till the action stops. It is then fixed in acid fixing bath. The result is a fairly soft print. A still softer print is obtained by giving a fuller exposure (say four times the correct exposure for the shadows) and taking correspondingly more of the bichromate, i.e., 4 c.c.s. In each case development is carried right through; the stronger the action of the bichromate the longer development takes.

The time of treatment in the bichromate bath is also subject to a simple rule depending on the volume to which the measured amount of 5% bichromate solution is made up. This latter volume (in c.c.s.) is equal to the exposure factor found in the two tests. This amount is diluted to any convenient volume. Then, the number of c.c.s. in the working bath multiplied by $1\frac{1}{2}$ gives the number of seconds for the bichromate treatment. Thus, if the bath is 100 c.c.s. bathe for 150 seconds ($2\frac{1}{2}$ minutes); if 120 c.c.s., bathe for 180 seconds (3 minutes). It is advisable to make 100 c.c.s. the minimum to ensure even action.

This rule has been worked out for a dark-room temperature

of 54° F. (12° C.). It appears to work fairly steadily by allowing 10 secs. less time for each degree Fahr. above 54°, and vice versa for lower temperatures. Or, alternatively, 18 seconds per degree Cent.—B.J., 1932, Feb 26, p. 119.

High-Key Prints by Re-development.—In preference to development with very dilute developer for making high-key prints, H. Lauber employs a method of high-key printing by re-development as more certain in its results.

A print is exposed, developed and fixed in the usual way. After washing, it is bleached in a Bromoil bleaching solution, thoroughly washed and dried a second time. Then the print is re-soaked, and immersed in a very dilute developer so that the image comes up very gradually. The tanning which the shadows have received under the action of the bleacher delays the growth of density in these parts and enables one to stop the development when a suitable effect has been produced. The re-developed print is rinsed and transferred to an acid fixing bath for the removal of residual silver image that has not been re-blackened. The only drawback to this process is that certain papers tend to give a slightly brownish tint on re-development instead of the neutral black that best suits the high-key style.—Photo Revue, 1932, Jan. 1, p. 8.

Clearing Stained Prints.—For the treatment of prints which show slight veiling or stain, Dr. A. Lichtenberg has recommended the use of the hypo-alum toning solution in preference to the usual hypo-ferricyanide reducer.

The reducing solution is the ordinary hypo-alum bath for direct toning made up as follows:—

Hypo	...	...	200 gms.	4 ozs.
Potash alum (powdered)	...	...	40 gms.	350 grs.
Boiling water	...	...	1,000 c.c.s.	20 ozs.

For use as a stain remover this bath does not need to be "ripened"; it is ready for use as soon as it has cooled down sufficiently. The print may need to be immersed for from five minutes to an hour, and a large number of prints may be treated together, with occasional agitation.

As this solution does not produce any toning effect in the cold in less than three or four hours, there is no risk of altering the tone of the image even when the heaviness of the yellow fog necessitates an hour's immersion. After removal of the stain, the print is swabbed with cotton wool and washed in water. The bath which has been so used can be employed afterwards for the sepia toning of bromides in the usual way.

As an alternative, lightly stained prints may be cleared by bleaching the print (with either a bichromate or a ferricyanide bleacher) and re-developing.

But with prints having a dark brown stain, this latter may be too intense to yield to either of the above remedies.—Phot. Rund., 1931, August, p. 275.

BORDERS AND MARGINS IN BROMIDE PRINTS.

Black-line Borders.—It is quite a simple matter, as R. R. Rawkins has pointed out, to treat a glass negative so that it prints a black line border simultaneously with the image. The method is to cut away the gelatine round the edges of the negative, leaving margins of clear glass (fig. 1). A permanent mask is then built up with black gummed strips so that a narrow line of clear glass is left. This completes the preparation of the negative (fig. 2), which then gives prints with a narrow black line round the picture and a white border outside that.

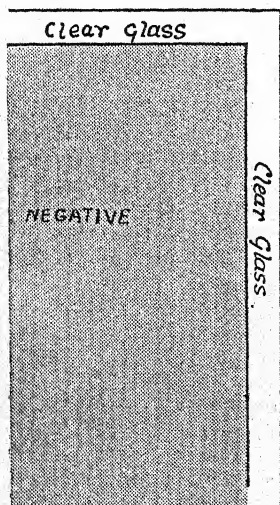


Fig. 1. Negative with film scraped away from edges.

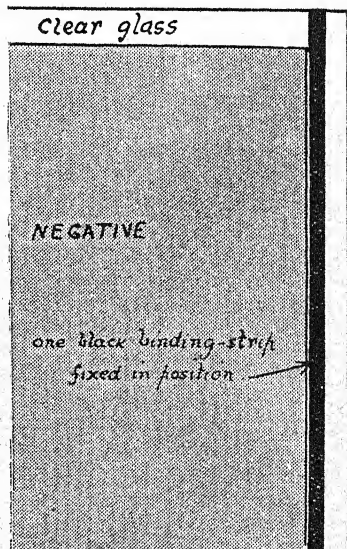


Fig. 2. Negative with one side masked.

Begin by marking on the film, in pencil, the exact portion to be masked off, making sure that the rectangles are exact.

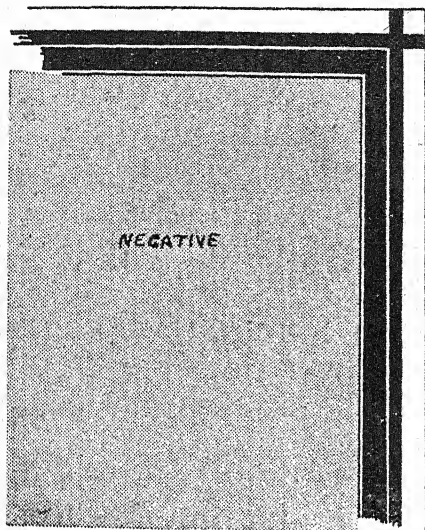


Fig. 3. Double black line effect.

Place a flat steel ruler along one of the lines and, holding it down firmly, run a sharp pocket-knife *upwards* along the edge of the ruler, making a clean cut through the gelatine to the glass. Then, without shifting the ruler, turn the knife slightly outwards to widen the cut. Then, by moving the ruler gradually outwards, the margin can be stripped clear of gelatine. If the gelatine is hard and brittle, the first cut only should be made in a downward direction, to avoid

partial tearing away of the film.

With a transparent celluloid set-square a thin line at exact angles is then cut as a guide for the next cut, which is made, as before, with the aid of the steel ruler. Clear the remaining edges in the same manner. The opaque mask may be built up very conveniently from strips of "Specialist" black lantern slide binding. A coating of clear celluloid varnish is advisable, if the negative is likely to be used much.

A double black-line border may be obtained, in elaboration of this idea, by trimming away the edges of the inner strips of the opaque binding and fixing outer strips again with a very narrow interval of clear glass (fig. 3).

In contact printing special care must be taken to obtain even contact; and with a dense negative, involving a long exposure, the black line is liable to spread unpleasantly by irradiation. The effect is better with contact prints than with enlarged prints.—B.J., 1931, Dec. 25, pp. 767-768.

Printing Masks for Miniature Films.—In the printing of miniature films, such as the Leica and 3 × 4 cm. sizes, the use of double-weight paper usually leads to fuzzy images.

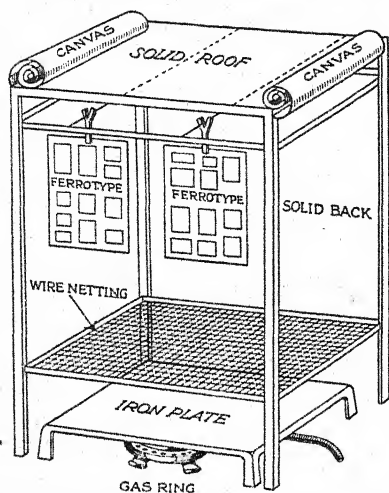
The reason, as has been pointed out by H. Westendorp, of the Agfa department of the I.G. Farbenindustrie A.G., is that the thickness of the printing mask and the small size of the aperture in the mask make it impossible to press a stiff printing paper into close contact with the negative, with the result that prints are unsharp round the edges. And, if the mask is put under the film negative instead of on it, the middle of the print is often fuzzy, due to the uneven base on which the negative lies.

Apart from projection printing there is only one real solution of the difficulty. That is to make the masks photographically on process film, leaving printing apertures of clear film corresponding with the small negatives to be printed. This mask can be made by sticking accurately cut rectangles of opaque paper on a sheet of glass, exposing a sheet of process film in contact with this and developing to full density. This mask is laid on the bed of the printing box and, thanks to its even surface, perfect contact can be obtained between the negative strip placed on it and even the thickest variety of printing paper.—*Phot. Indus.*, 1931, Oct. 14, pp. 1113-1114.—*B.J.*, 1932, Jan. 8, p. 13.

FOR FLECKLESS GLAZING.

A Drying Cabinet for Ferrotypes.—One of the commonest troubles in glazing is that of irregular lifting from the glazing plate, with the consequent formation of "oyster-shell" markings in the glaze. The avoidance of this fault depends on even drying of the prints and is best ensured by allowing them to dry slowly in a room without heat or draught.

However, for D. and P. purposes, where much quicker production is necessary, this system is not suitable. One popular method amongst the smaller D. & P. workers is to clip the ferrotypes to a wire which, when full, is hauled up close to the ceiling of a warm room. When they are *nearly* dry, or dry enough to be stripped off, the line is lowered and the prints peeled off; prints peeled off by hand do not show oyster-shell markings. The prints should not fall off when dry; if they do they have probably been unduly hardened. Prints which persist in sticking to the glazing support have at some stage been incorrectly handled. Prints should not stick if the following points are attended to: (a) Clean the glazed



surface well with a wet chamois leather, followed by a swill with water, which in turn is swept off with a flat rubber squeegee. (b) The prints should have been properly fixed and washed, and the fixing bath should be the ordinary hypo-metabisulphite bath, in fresh active condition.

(c) The glazing solution must be well rubbed in over every part of the glazing surface,

and (d) too much pressure in squeegeeing must be avoided.

It is very satisfactory simply to clean the glazing surface, to soak the prints in batches in a 1 in 50 solution of "Bango," and draw them direct from this solution, placing each print face down to the surface after allowing the solution carried by each print to "pool" on the glazing surface and lowering the print in the "pool." A sheet of thin waterproof cloth or stout paper (used wet) is laid over the prints, and the squeegee applied—not heavily nor too lightly.

A very efficient heating cabinet, rapid in action and with very little tendency to "oyster-shell" markings, made as shown in the diagram, employs gas heating and provides a warm atmosphere, as still as possible. The apparatus is simply a light wooden framework built against the wall, or with a solid back, and a solid roof of three-ply. About six inches from the inside top of this roof were fitted two wires with wooden clips at intervals, to take the loaded ferrotypes. At about twelve inches from the floor a piece of rabbit wire was stretched across the framework to catch the prints. At about six inches from the floor was a large iron plate, the size of the framework, with iron leg supports, and under this was placed a gas-ring. The essential part of the apparatus is the canvas "cover-in": three pieces of "deck-chair" canvas cut to size, so that when nailed to the top of the

device they can be draped down the sides and front to cover in from the roof to the netting completely. Push-on buttons can be fitted to the end of each canvas, and the necessary sockets fitted to the bottom struts.

When the lines have been filled with loaded ferrotypes the canvases are unrolled and fastened, the gas-ring lighted (full on at first, but lowered after a few minutes) and the apparatus left to do its work. The iron plate soon becomes hot, the heat rises, is split up by the wire netting, and the air around the ferrotypes will become warm but humid, and fairly still—conditions which are ideal—but a certain amount of moisture is absorbed and escapes through the somewhat porous canvas. The wire netting should be of fine mesh rabbit netting; two layers can be used, and will do much to distribute the heat evenly. The ferrotypes can be about two inches apart on the lines.—B.J., 1932, March 11, pp. 148-149.

Stripping Transferotype with Chloral Hydrate.—The stripping of Transferotype paper is sometimes found to present difficulty when an intermediate support, such as waxed celluloid, is used for transfer. To avoid frilling under these conditions Dr. H. E. Durham advocates the use of chloral hydrate (poison) to aid the stripping of the paper.

Before a print is soaked for transfer its edges should be trimmed—a sixteenth of an inch is enough—and each corner scraped clear of gelatine, at the extreme tip, with a very sharp pen-knife. With Transferotype a full three minutes' soaking is recommended. The joined surfaces are left in contact for a least an hour—preferably two or three.

The sheets are then removed, placed on some flat support, and the paper-backing of the print liberally brushed over with a twenty per cent. solution of chloral hydrate; care should be taken that the wetting is liberal and extends up to or beyond the edge of the print. The packs are then abandoned for half or one hour to allow the agent to soak through and attack the soluble gelatine backing. At the end of such time, any solution which will pour or drip off may be returned to the stock bottle. The solution keeps well.

The pack is then placed in warm water (say at 102° F., for 2½ minutes), when the backing will be found to peel off with perfect ease and without any frilling. As the fixed film is slowly raised from the bath of warm water, some of the water is gently poured from a cup about the line of meeting of air and water; this will entirely remove any remains of soluble gelatine by the time the print is withdrawn from the bath.

The use of chloral hydrate is in fact advantageous in Transferotype work whatever kind of surface is to receive the image.—B.J., 1931, Dec. 25, pp. 776.

SULPHIDE TONING.

Papers, Bleach and Tones.—Dr. H. Nitze, in a communication from the Agfa laboratories, has described experiments showing how sulphide tones ranging from purplish brown to yellowish brown are obtainable according to the sensitive paper, developer and bleach. The finer the grain of the developed black image, the warmer the sulphide tone and vice versa. Thus Brovira bromide paper which is of relatively coarse grain gives a colder tone than Lupex, whilst Record, a chloro-bromide paper of fine-grain image, tends to give a warmer tone than either. These variations may be combined with the use of bleaching baths made as follows, viz. :—

Coarse-Grain Bleach.

Potass ferricyanide, 10% solution ...	3 ozs.
Potass bromide, 10% solution ...	5 ozs.
Water, to make	10 ozs.

Fine-Grain Bleach.

Potass ferricyanide, 10% solution ...	7½ ozs.
Potass bromide, 10% solution ...	½ oz.
Water, to make	12½ ozs.

The various tones obtained on the above papers by use of the bleaching baths are shown in the following table :—

Coarse-grain Bleach. Fine-grain Bleach.

Brovira (4 grades)	Purplish-brown	Chestnut-brown.
Lupex (4 grades)	Dark brown	Yellowish-brown.
Record (3 grades)	Chestnut-brown	Soft yellowish-brown

It may be mentioned that no perceptible difference could be observed in the tones obtained when using the various grades of contrast of a particular paper.

By using a bleach intermediate in composition between those employed respectively for coarse and fine grain, intermediate tones are obtained in the subsequent treatment. Thus, the following is a "Standard-grain Bleach," viz. :—

Potass ferricyanide, 10% solution ...	5 ozs.
Potass bromide, 10% solution ...	3 ozs.
Water, to make	10 ozs.

In cases where it is desired to obtain prints of yellowish-brown tone when using the strongly ripened emulsion of Brovira paper, use may advantageously be made of a somewhat slow-acting but fine-grain developer, viz. :—

Hydroquinone	...	...	6 gms.	53 grs.
Soda sulphite, dry	...	...	20 gms.	175 grs.
(or Soda Sulphite, cryst.	...	...	40 gms.	350 grs.)
Soda carbonate, dry	...	...	30 gms.	260 grs.
(or Soda carbonate, cryst.	...	...	81 gms.	710 grs.)
Potass bromide, 10% solution	...	...	3 c.c.s.	30 minims.
Water	...	...	1,000 c.c.s.	20 ozs.

In using this developer, exposure should be such that prints of the required depth are obtained within $2\frac{1}{2}$ to 3 minutes' development. Prints should be bleached in the Fine-grain bath given above.

In all cases the toning (darkening) is done with sodium sulphide solution of $\frac{1}{2}$ per cent. strength, viz., 45 grs. of soda sulphide dissolved in 20 ozs. of water.—B.J., 1932, Aug. 12, pp. 486-487.

Avoiding Yellowish Tones.—Apart from faulty development of the original bromide prints, an important cause of unsatisfactory, yellowish tones in prints sepia-toned by the bleaching process has been made clear by E. E. Jelley, B.Sc., of the Kodak Research Laboratories (Harrow).

This cause is the use of a partially exhausted sulphide solution in conjunction with a bleached print that has not been washed free from the ferricyanide bleacher.

So long as either the bleached print is well washed before sulphiding or the darkening is carried out with a fresh sulphide solution, the normal rich brown tone is obtained.

Since ferricyanide is much more easily washed out of the bleached print when the solution is alkaline, the bleaching bath should itself be made alkaline, by the addition of sodium carbonate to the amount of 15 gms. per litre (130 grs. per 20 ozs.). This does not affect its bleaching action or keeping quality. Short washing—three minutes if convenient, or one minute only if necessary—will then leave the prints in a condition in which yellowness cannot result through a stale condition of the sulphide solution.—B.J., 1932, April 1, pp. 200-201.

Unusual Sulphide Processes.—Various methods of obtaining pleasing and uncommon combinations of colour in bromide prints by toning have been pointed out by D. Charles. The methods of pre-sulphiding and of partial bleaching, as modifications of straightforward sulphide toning, are well known. In the latter case a double-toning effect, very pleasing for portraits, is obtained by bleaching until only the deepest shadows retain part of their grey image and then sulphiding.

If a print is double-toned in this way, well washed and then treated with a gold toning bath, the warm high-lights are reddened and the shadows are made richer and colder. A "cinema" portrait, for example, can be rendered in this way with the face and flaming hair glowing in warm colour, against a receding range of browns and blue-black shadows. For display photographs or transparencies the effect is extraordinarily good.

A result of the same kind, though "cheaper" in its effect, can be made with less trouble and less expensive toning baths. The method is to develop a bromide print—preferably a fully exposed, glossy print—so that it will tone to rather a warm colour. It is partially bleached and sulphided to give the warmest possible tone in the lightest parts. The shadows, which are thus left rather light, are darkened to a rich blue by treating the print with an iron-ferricyanide blue-toner. This leaves the sulphide-toned high-lights warm, as they were previously, and gives a bluish tinge to all the deeper tones of the picture. The result does not, however, equal the rich and glowing effect of prints toned as above-described with the aid of the gold toner.—B.J., 1932, Feb. 5, p. 77.

SULPHIDE-GOLD TONING.

Red Chalk Tones.—As an improvement on the usual method for the red chalk toning of sulphide-toned prints, H. Cuisinier recommends the following procedure, by which high-light details are better preserved :—

The original prints—slightly over-exposed—should be developed in a solution made by mixing 1 part of the ordinary developer with 1 to 2 parts of water, so as to obtain prints in which there are no strong blacks. Special care should be given to the fixing, in two baths in succession. The washed prints are then toned by the two-bath sulphide method. The bleach should consist of the usual mixture of ferricyanide and bromide, or of permanganate and hydrochloric acid. Prints are carefully rinsed and then re-developed in a weak solution of sulphide—a freshly prepared 1.5 per cent. solution of barium sulphide or a 1 per cent. solution of sodium sulphide. In consequence of the over-exposure this procedure results in prints of yellowish sepia tone. A brownish tone, or a bright sepia, does not allow of obtaining the best red-chalk tone in the subsequent treatment.

The sulphide-toned prints are well washed and then immersed in a toning bath prepared by mixing equal parts of the two

following stock solutions, each of which keeps well.

A. Thiocarbamide	...	...	18 grs.	2 gms.
Tartaric acid	...	...	18 grs.	2 gms.
Distilled water, to make	...	...	20 ozs.	1,000 c.c.s.
B. Gold chloride, brown	...	...	9 grs.	1 gm.
Common salt	...	...	175 grs.	20 gms.
Distilled water, to make	...	...	20 ozs.	1,000 c.c.s.

Prints take from 10 minutes to 1 hour to tone, according to the degree of freshness of the bath. Prints should be treated in this gold-toning bath until only traces of black image are to be seen in the shadows. But the normal time of toning can be considerably exceeded without any harm coming to the prints.

Toning having been completed, the prints are rinsed in several changes of water, fixed for 5 minutes in a plain 5 per cent. solution of hypo and then thoroughly washed. Prints treated according to the above process consist of a sulphide of gold and silver less liable to change than the ordinary black silver deposit. The gold toning bath keeps well for several days. As prints are treated in it, it is well to revive it by adding small quantities of the stock solutions A and B.—Rev. Fr. Phot., 1931, Dec. 15, p. 380.—B.J., 1931, Dec. 25, p. 777.

CHLORO-BROMIDE PAPERS.

One Paper for All Negatives.—A method of printing recommended by P. Wiegler offers the advantage that any kind of negative can be printed on one variety of paper and any reasonably full exposure will give a good print.

For this, a rapid warm-tone chloro-bromide paper is essential and a slow-working glycin-hydroquinone developer, giving an image of colour from warm-black to red brown. An ordinary metol-hydroquinone developer is useless for this purpose. The developer to use is:—

A. Soda sulphite, cryst.	...	36.7 gms.	320 grs.
Glycin	...	2 gms.	18 grs.
Hydroquinone	...	6.7 gms.	58 grs.
Potass. bromide	...	0.3 gm.	2½ grs.
Water	...	1,000 c.c.s.	20 ozs.
B. Potass. carbonate	...	50 gms.	1 oz.
Water	...	1,000 c.c.s.	20 ozs.

These stock solutions are mixed in equal parts and the mixture diluted with three times its volume of water to make the working solution.

The chloro-bromide paper is given an exposure which is three or four times as long as is estimated to be correct for an ordinary black print developed with metol-hydroquinone.

If the negative is specially vigorous still further over-exposure may be given, and with weak negatives the exposure should be reduced to about twice the estimated exposure. In this way a number of exposures can be run off, giving exposures which are always known to be liberal.

The exposed papers are then immersed, as many as twelve at a time, in a large volume of the developer. The images come up very slowly, no image showing for five or ten minutes. The shadows first show up lightly, the half-tones and high-lights following slowly, so that the image comes up in full detail, but soft and thin. Then it begins to gain density and vigour, and development is continued until the desired contrast is reached.

Prints from thin negatives are better less fully exposed, and developed in a less dilute developer, viz., one made by adding 1 to 2 volumes of water only to the mixed stock solutions. In this case warm black prints are obtained.

The tones obtained in this way range from warm black to olive black with soft negatives; warm black to brown with average negatives; and brown black to red brown with vigorous negatives. The tones obtained are rich and pure, and with matt papers give the effect of gravures.

A bath made up with 10 ozs. of each of the stock solutions and 60 ozs. of water is sufficient for the development of twelve 16×12 ins. prints. For the next twelve prints it is only necessary to strengthen the bath with 5 ozs. of the stock solutions. When the developer is over-worked it begins to give a red-brown stain in the whites.—Camera (Lucerne), 1932, April, pp. 331-335.

Developer for Chloro-Bromide.—The introduction of Chlorquinol, a new British product, provides a developer which is especially suitable for warm-tone papers. The formula below has been worked out by W. Pritchard.

No. 1.

Chlorquinol	60 grs.	7 gms.
Soda sulphite, cryst.	1 oz.	50 gms.
Potass. bromide	4 grs.	.45 gms.
Water, to make	10 ozs.	500 c.c.s.

No. 2.

Soda carbonate, cryst.	$1\frac{1}{2}$ ozs.	75 gms.
Water, to make	10 ozs.	500 c.c.s.

For use take one part of each solution and add eight parts of water.

Using the formula given above, the following table shows

the dilutions necessary for producing various colours. The addition of more potassium bromide leads to no improvement in colour and prolongs the development time to an unnecessary extent.

	No. 1.	No. 2.	Water	Times Normal Exposure	Times of Development 65F.
Warm Black ...	1 part	1 part	8 parts	1	3 minutes
Sepia	1 part	1 part	12 parts	2	3 minutes
Warm Brown	1 part	1 part	16 parts	3	3 minutes

—B.J., 1932, June 17, p. 364.

ENLARGING.

Improving a Condenserless Enlarger.—From his experience with a well-known self-focussing enlarger J. Erith has pointed out the possibility of improving some of these instruments by re-surfacing the inside of the lamp-house. In the case of an instrument in which the lamp-house was coated with a smooth, white enamel surface, the effect of covering the inside with silver wrapping from boxes of portrait films was to reduce exposures by about a third, without any loss of quality in the prints.—B.J., 1931, Oct. 9, p. 610.

A. J. Mason has pointed out, on the other hand, that it was usually a matter of the utmost difficulty to obtain uniform illumination unless the reflector is coated with absolutely even, *mat* metallic coating. To apply this, first clean the reflector thoroughly and make the surface *as smooth as possible*. Apply a coat of gold size, allow this to become tacky and then lightly dust with aluminium powder, using a large, soft camel-hair brush with a dabbing action and taking care not to "pull" the surface. When this has thoroughly dried (about two or three hours), wipe off any excess of powder with a soft duster. Aluminium paints and lacquers are useless, owing to the reflecting surface formed by the medium itself. This re-surfacing should be applied every two or three years to enlargers which are in constant use.—B.J., 1931, Oct. 16, p. 625.

Temporary Dishes for Enlarging.—A quick method of making a cheap and efficient dish by lining a wooden tray or box with the thinnest variety of unsanded roofing felt has been described by Thermit.

A piece of felt is cut equal to the length and breadth of the box *plus* four times the depth. For example a box 20 × 16 × 2 ins. would require felt 28 × 24 ins. This is pushed gently into the box, and the corners folded. It is then tacked to the outer sides and swilled out with water. It makes a water-

proof container capable of lasting for months, or years if used only occasionally.—B.J., 1932, May 13, p. 297.

Negatives for High-Scale Enlarging.—In view of the growing use of very small negatives and the printing of these on a large scale of enlargement H. Pander has discussed the factors which limit the fineness of definition in these small negatives. He asserts that whilst very high degrees of enlargement, e.g., 32 diameters, are often quite satisfactory in the case of close-up portraits with 20 mm. cine lenses, objects taken at greater distances do not lend themselves so well to great enlargement.

The first limiting factor lies in the faults which are present even in the excellent, highly corrected lenses of to-day. An average 2-in. anastigmat may be assumed to represent a point in the object as a disc of diameter 75μ (i.e., 75 thousandths of a millimetre) in the focussed image. With the customarily assumed standard of definition, which is that the circle of confusion shall not exceed 100μ , this figure of 75μ comes well within the specified limit. But the demand that small negatives shall be used for exceptionally big scales of enlargement implies a standard of still smaller circles of confusion, in certain cases as small as 10μ . This means much finer definition than the lens, with its assumed standard of 75μ , will give. Even allowing for the fact that the disc given by the lens as the image of a point in the object has its intensity concentrated chiefly at the centre it is not permissible to assume a smaller limit than $20\text{--}30\mu$ as the standard of definition reached by the lens.

Further, even if a disc of this small diameter be assumed to be formed, as part of the image, on the surface of the emulsion, this minute disc spreads as the image records itself in the deeper planes of the emulsion, and still other factors enter into the formation of the silver-grain image during the development and the drying of the negative. For this reason it is safer to assume that true points in the object at the plane of focus are represented in the lens image by discs not smaller than 30μ in diameter. The effect of stopping down the lens is to increase the depth of field, without necessarily reducing the diameter of these discs.

It follows that a lens has a certain resolving power, which varies with the focal length; and it is possible to express this in terms of the size of object which at any given distance is just too small to be defined clearly by the lens. Assuming a disc of confusion of 30μ , the following values (in millimetres) are obtained for this critical dimension of object for given focal lengths and focussing distances :—

Focal lengths.	Focusing distance (metres).						
	1	2	3	4	5	8	10
mm.	millimetres						
15 ...	2	4	6	8	10	16	20
20 ...	1.5	3	4.5	6	7.5	12	15
25 ...	1.2	2.4	3.6	4.8	6	9.6	12
30 ...	1	2	3	4	5	8	10
40 ...	0.75	1.5	2.25	3	3.75	6	7.5
50 ...	0.6	1.2	1.8	2.4	3	4.8	6
75 ...	0.4	0.8	1.2	1.6	2	3.2	4
100 ...	0.3	0.6	0.9	1.2	1.5	2.4	3
120 ...	0.25	0.5	0.75	1	1.25	2	2.5
150 ...	0.2	0.4	0.6	0.8	1	1.6	2

This table can be extended to the right (for greater distances) or downwards (for great focal lengths) merely by altering the placing of the decimal point.

Thus with a 20 mm. lens used on a "close-up" at a distance of 1 metre details of the subject of size 1.5 mm. may be expected to be sharply recorded. But with a 50 mm. lens and an object at 1 km. (just over $\frac{1}{2}$ mile) a 2-ft. object is too small to appear in the negative.—Camera (Lucerne), 1932, Jan., pp. 219-222.

LANTERN SLIDES.

Simplified Thiocarbamide Developer.—A very much simplified method of making lantern slides in the distinctive colours given by means of thiocarbamide has been worked out by H. O. Fenton. He recommends two methods particularly as being very easy and certain.

In each case the same two solutions are required, viz. :—

- | | | | |
|---------------------|-----|---------|--------------|
| A. Ammonium bromide | ... | 1 oz. | 100 gms. |
| Water | ... | 10 ozs. | 1,000 c.c.s. |
| B. Thiocarbamide | ... | 33 grs. | 7.5 gms. |
| Ammonium bromide | ... | 11 grs. | 2.5 gms. |
| Water | ... | 10 ozs. | 1,000 c.c.s. |

For the developer, dissolve a pair of Burroughs Wellcome Rytol tabloids in 4 ozs. of water. Add 70 minims of solution A and 10 of B. Expose the slide in strips, the first strip receiving the normal exposure required when the slide is developed for black tones with Rytol only. The second strip should have double this exposure, and so on. When developed and fixed one of these strips should be found to have the correct contrast. At this part of the test it is correct contrast that we are aiming at.

Now expose the whole of another plate for the ascertained time, and develop for correct *density*. Don't bother about the colour; that has already been determined by the exposure and the amount of thiocarbamide, and you cannot alter it now. But it should be a very good grey, with possibly a suspicion of blue. Possibly it may be a wonderfully rich black.

Now repeat the experiment three times, increasing the quantity of B to 20, 30, and 40 minims respectively. Notice how the colour becomes more blue on each addition of thiocarbamide. Finally, you will get a colour that is too blue to be pictorial. If purples or magentas have appeared it is quite possibly owing to too high a temperature. Try developing at 60 to 65 degrees Fah.

One pair of Rytol products can be made to develop four slides. Economy can be effected, having added the 70 minims of A, by dividing the Rytol into four parts of one ounce each. In that case, dissolve the Rytol in two ounces of water only, and divide it into four half-ounces. To 40 minims of B enough water is added to make one ounce in all; 30 minims of this will give us the required $2\frac{1}{2}$ minims of B. These are added to the half-ounce of Rytol, and the total bulk made up to one ounce by the addition of water. Labelled carefully, these experimental slides will give a complete epitome of the process for future reference.

The second method consists in using pyro instead of Rytol. The procedure is the same as for Rytol. The pyro solution may be made up as follows:—

Ammonium bromide, 10% sol.	21 c.c.s.	200 minims.
Ammonia, 10% sol. of .800		
liquor	15.6 c.c.s.	150 minims.
Pyro (dry)	1 gm.	8 grs.
Water, to make	200 c.c.s.	4 ozs.

This pyro solution will not keep, having no preservative. With the smaller quantities of thiocarbamide the slide may be an excellent brown in colour and of the utmost transparency. With most brands of plates amidol, and especially glycin, act well as the developing agent.—B.J., 1931, Dec. 11, pp. 741-742.

Blue Toning.—Positives on lantern plates (or gaslight papers) may be toned to a very pleasant blackish blue, verging on to slate grey, by a process of gold-sulphocyanide toning described by H. Schiedmayer.

Two stock solutions are required for the preparation of the toning solution:—

A. Ammonium sulphocyanide	40 gms.	1 oz.
Water	1,000 c.c.s.	25 ozs.
B. Gold chloride (1% sol.) ...	60 c.c.s.	1½ ozs.

The above solutions are mixed in the proportion of 100 c.c.s. (2½ ozs.) of A to 6 c.c.s. (72 minims) of B, the latter being added drop by drop with constant stirring. The toning solution must not be used until twelve hours after it has been mixed: if used before this time, it is liable to attack the film and cause it to leave its support. When it has once been used for toning, the solution must be thrown away. Before toning, transparencies must be very thoroughly washed. Bromide papers are not suitable for this mode of toning.—Phot. Rund., 1932, April, p. 136-137.

THE BROMOIL PROCESS.

Modified Bromoil and Bromoil Transfer.—The following working formulæ for a method of preparing bromide prints for the Bromoil and Bromoil transfer process have been worked out by Dr. Henry Kreuder and John G. Hildebrand for the purpose of speeding-up the process, which relies on the fact that the enlargement is fixed only once, being bleached immediately after development.

The negative used should be similar to that usually recommended for Bromoil, and full exposure of the enlargement is essential, development being continued until there is a slight deposit of silver in the high-lights; if the exposure has been correctly timed the shadows will not be completely developed. The print should appear to be just a little flat.

The following developer is ready for use and it is better to use fresh solution for each print. Temperature should be about 70° F. and time of development about three minutes.

Metol	0.5 gm.	4½ grs.
Hydroquinone	0.5 gm.	4½ grs.
Soda sulphite, dry	3 gms.	26 grs.
Soda carbonate	3 gms.	26 grs.
Potass. bromide, 10% sol. ...	1 cc.	10 mins.
Water, to make	1,000 c.c.s.	20 ozs.

When development is complete, place the print *directly* into the following stop bath:—

Boric acid, crystals	30 gms.	260 grs.
Borax, powdered	1 gm.	9 grs.
Boiling water	1,000 c.c.s.	20 ozs.

This bath must, of course, be made up beforehand and allowed to cool. It keeps indefinitely. Prints should remain in this

stop bath for about two minutes, and its temperature should be the same as that of the developer.

After remaining in the stop bath for the required length of time, the print should be rinsed in running water for about three minutes. Subsequent operations such as bleaching and fixing may be carried on in weak artificial light.

BLEACH STOCK SOLUTION.

Copper sulphate	...	...	70 gms.	615 grs.
Potass. bromide	...	...	70 gms.	615 grs.
Ammonium bichromate	...	...	3 gms.	26 grs.
Water, distilled	...	...	1,000 c.c.s.	20 ozs.

The above is a concentrated solution, which should be diluted for use as follows :—

Stock solution...	...	...	50 c.c.s.	2 ozs.
Water, to make	...	...	500 c.c.s.	20 ozs.
Soda carbonate, 10% sol.	...	...	2 drops	2 drops

A print will usually be completely bleached in three minutes, but it should be allowed to remain in the bleaching solution for five minutes. The prints will show a residual image of a greenish brown colour which will, however, completely disappear in the fixing bath. Deep shadows will show a little.

After bleaching, the prints should be washed in running water for about three minutes.

FIXING.

The fixing bath is made up as follows :—

Soda hyposulphite	...	...	50 gms.	1 oz.
Potass. metabisulphite	...	...	5 gms.	45 grs.
Water, to make	...	...	1,000 c.c.s.	20 ozs.

It is important that this bath should be made up accurately. Prints should be allowed to fix for at least ten minutes.

After fixing, wash the prints in running water for about fifteen minutes.

Blot off all surface moisture, both front and back, and hang the prints up to dry. Use a soft cloth or a piece of chamois to remove the surface moisture, and in doing this, dab the surface of the print gently; do not wipe it. The prints should be allowed to become thoroughly dry before they are soaked to prepare them for inking.—*Amer. Phot.*, 1932, May, p. 239.—*B.J.*, 1932, May 20, pp. 307-308.

F. J. Shepherd points out that the above method is closely similar, both in the main and in details, to that for the Oleobrom process described in the *Photographic Journal*, 1931, pp. 500-510, and corresponds with the instructions for Oleobrom issued by Wellington & Ward.—*B.J.*, June 24, 1932, p. 391.

Pneumatic Matrix Carrier.—A pneumatic lifting device to facilitate the raising of the Bromoil matrix and replacing it in exact register in making transfers has been designed by J. S. Greig, who recommends it as a great convenience.

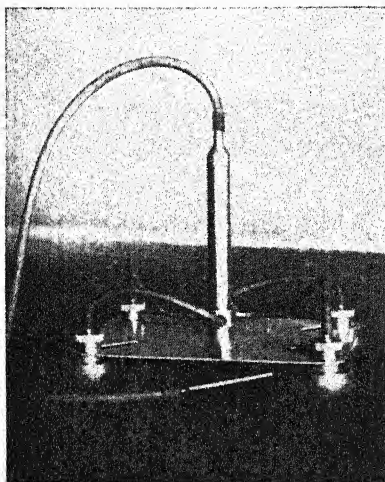


Fig. 1.

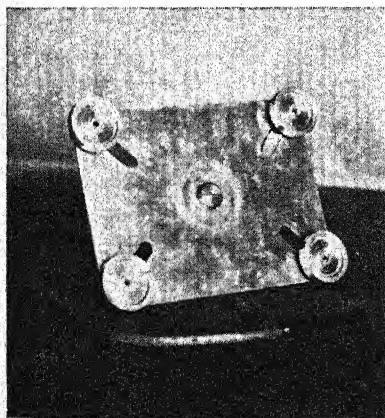


Fig. 2.

It consists (figs. 1 and 2) of a light aluminium plate with four suckers, the flexible suction pipes of which are joined to a hollow aluminium handle fastened to the centre of the plate. Attached to the top of the handle is a length of rubber tubing carrying an ebonite mouthpiece. Each sucker is formed with a water groove to act as an air seal; and to prevent the matrix being unduly bulged by the atmospheric pressure a small supporting piece is formed in the centre of each recess.

To make the instrument suitable for prints of various sizes and shapes, three aluminium plates are used, to suit prints from $4'' \times 4\frac{1}{2}''$ to $10'' \times 12''$. To allow of adjustment the suckers are carried in slots which enable them to be moved away from or towards one another, and for large matrices the centre screw holding the handle to the plate is replaced by an additional sucker. Fig. 3 shows the matrix firmly held on the carrier, ready for placing on the transfer paper.



Fig. 3.

For registering a matrix that is replaced on the transfer paper after a second inking a piece of plate glass $\frac{1}{8}$ -in. thick (and conveniently of size 9" x 3") is used as a straight-edge. One of the longer sides is ground truly straight, and the edges left perfectly square without any trace of bevelling. After the print has been passed through the press for the first pull, the transfer paper with the adhering matrix is laid upon a flat surface and four register marks made in the usual way with a soft lead pencil. The heavy glass straight-edge is then laid alongside one edge of the matrix, and in contact

with it, and the matrix stripped from the transfer paper, care being taken not to move the straight-edge.

When replacing the matrix after re-inking, it is only necessary to press the edge of the matrix lightly against the edge of the straight-edge and slip the matrix along until the register mark on the opposite edge comes into coincidence.—B.J., 1931, Nov. 6, pp. 663-664.

Overcoming General Tanning.—As a remedy for the difficulty of general tanning of Bromoil prints in a locality where the water is believed to contain a certain amount of iron, S. Grimshaw has suggested the use of a bleacher, as follows, made up without acid:—

Potass. bichromate (1% sol.)	...	...	10 parts
Potass. bromide (10% sol.)	...	...	4 parts
Copper sulphate (10% sol.)	...	...	4 parts
Water	...	...	10 parts

Potass. metabisulphite should be avoided in the hypo bath and a print developed to a factor not higher than 5.

From experience of the local tanning of the gelatine of Raydex prints by the use of iron paper clips F. R. Newens

has suggested that iron in the water might easily account for this trouble in Bromoil.—B.J., 1932, Mar. 25, p. 190.

THE CARBON PROCESS.

Developing Photobiasé.—While the carbon process as usually practised gives fine, velvety prints—and is highly suitable for certain types of subject with which the Bromoil process is not very successful *e.g.*, against-the-light effects, scenes in heavy shadows, Rembrandt portraits, snow scenes and portraits of sitters in clothes light in colour—it requires rather skilful working and does not give much facility for artistic control.

A satisfactory method of developing carbon paper in the cold, as a substitute for the usual method with warm water, has been discovered by a French experimenter, Robert Dubois, in the use of a diastase ferment. One such ferment, a product of the secretions of bacteria of the genus *mesentericus*, has been placed on the French market under the name of Photobiasé by the Société Rapidase.

This is marketed as a yellow, soluble powder, which keeps perfectly if protected from moisture. The solution dissolves the unhardened gelatine from an exposed carbon tissue easily in the cold. Ordinary carbon tissues work excellently without increase of the normal exposure (about 15 minutes in the shade, under a clear sky), without effect on the pigment colours and without excessive tenderness of the gelatine surface. The action is progressive, and a somewhat undue time of treatment does not mean the removal of the whole image. The solution is neutral, absolutely harmless and without disagreeable odour; it does not attack brushes or paper, so that the permanence of the prints is not jeopardised; and by the use of a brush a large amount of control is possible. The operation is simple and very largely free from risk of failure when the following procedure, described by H. Cuisinier, is followed.

The exposed tissue is washed in cold water for 10-15 minutes, if preferred by daylight, since the wet tissue is practically insensitive. When the bichromate has been completely washed out, the print may be left to itself for several days.

To remove the unhardened gelatine a solution is used, containing 1 gm. of Photobiasé in 100 c.c.s. of water. Only sufficient should be made up for a single day's work, as the solution does not keep. In the case of great over-exposure the strength of this solution may with advantage be doubled. It is essential not to use water at more than 122° F. (50° C.) for making this solution.

If there is no reason to modify the image the Photobiase may be used in an automatic fashion. The washed carbon tissue is immersed in 1 per cent. Photobiase solution at a temperature between 59 and 68° F. (15-20° C.). After about 45 seconds' immersion stretch the sheet of paper on a sheet of glass and wash the pigmented surface with a mixture of cold water and sawdust, of the special kind supplied for use with carbon tissues. When no more of the coloured gelatine is removed, put the sheet back again in the Photobiase solution and repeat the sawdust treatment. If the sheet is so over-exposed that the removal of gelatine is difficult the temperature of the Photobiase may be raised gradually, up to a limit of 86° F. (30° C.). The cleaning of the print should be carried a little beyond the stage desired, because the image darkens appreciably on drying. Rinse in four or five changes of water and hang up to dry. If any bichromate stain remains, immerse the print for 2-3 minutes in a 5 per cent. solution of sodium bisulphite, rinse well and again dry.

When a certain amount of control is required, a soft brush is used instead of the sawdust mixture to remove the gelatine. This cleaning by brushwork succeeds best with a print that has been strongly tanned, *i.e.*, given twice or three times the normal exposure. The washed print is immersed in 1-2 per cent. Photobiase solution at 65° F. (18° C.). After about 45 seconds, without removing the print, the usual masked margins of the print are gently rubbed with a tuft of cotton wool. As soon as the colour begins to come away freely and the outlines of the image begin to appear, the print is drained, laid out on a sheet of glass and placed in a second dish filled with cold water. A variety of brushes—for example a soft flat brush 2 ins. wide, a flat hog-hair brush about $\frac{3}{4}$ in. wide and a number of small round brushes—should be available. The larger brushes naturally serve first for the development of the broad image, using a gentle circular movement, then sideways, then downwards. The smaller, harder brushes serve for local work, touching up accents of light tone, etc., with very gentle friction or tapping.

When the pigmented gelatine resists the action of the brush the print is returned again to the Photobiase solution before repeating the brushwork. From time to time the print should be cleaned under the tap or with a jug of clean water, so that the progress of the work can be properly judged.—*Le Phot.*, 1931, December 20, pp. 477-482.

COLOUR PHOTOGRAPHY.

Repeating Back for Colour Exposures.—An automatic repeating back for the purpose of making the three exposures necessary for many colour processes, has been patented by Colour Photographs, Ltd., and L. W. Oliver.

A repeating back slide is employed in which three films are used side by side, an appropriately coloured light-filter being placed in front of each. As with an ordinary repeating back, the ground glass is normally in front of the lens and is held in that position by means of a spring stop which may be depressed directly or by means of an Antinous release.

The back is operated by means of clockwork instead of by the usual hand method, and is so arranged that the slide is pulled across the focal plane by means of an endless wire and pulleys, and stopped for a suitable time for exposures to be made in sequence on each of the films. An exposure is made automatically at the completion of each changing operation, the appropriate time, which of course varies according to the film and filter which is in position, being operated by means of a dash-pot and plunger control.—Eng. Pat. 368,260.—B.J., "Colour Photography" Supplement, 1932, June 3, pp. 22-24.

Collochrome Prints.—A new process of colour printing from three-colour negatives has been introduced as Collochrome by Capt. Owen Wheeler, whose purpose has been to provide a simple and regular process for amateur colour workers. The process is a form of carbon printing on a blue-toned bromide as base.

The operations in Collochrome are (1) Preparation of the blue-toned bromide print from the red-record negative. (2) Printing from the green and blue-record negatives on "Special Grey" carbon tissue. (3) Mounting the printed tissues on prepared pieces of celluloid. (4) Developing the grey carbon images. (5) Staining the carbon images red and yellow. (6) Transferring the red and yellow images successively to the blue-toned bromide.

(1) *Preparation of the blue-toned bromide base.* This is made on the specially cut bromide paper supplied for Collochrome. It is printed rather lightly from the red-record negative and is developed with Rytol, two "tabloids" of each component in 8 ozs. of water. The print is toned with the Burroughs Wellcome Blue Toner, washed and immersed in "B.W." Bleaching Compound (1 "tabloid" to 4 ozs. of water), which gives a pure bright blue. Washing then completes the making of the blue base.

(2) *Printing from the green and blue record negatives.* Special Grey Autotype tissues—ready sensitised or sensitised with "B.W." Potass. Ammon. Chromate tabloids (1 "tabloid" to 2 ozs. of water, for the soft negatives desirable for the process)—are used for printing, exposures being controlled either with an Autotype Trichrome actinometer or a Chapman Jones Fraction Tint actinometer. For beginners it is a good plan to make exposure tests on P.O.P. simultaneously exposing the actinometer: when a light print has been obtained showing just general detail, the actinometer record will be a rough guide to the exposure for the tissue.

(3) *Mounting the printed tissues.* The celluloid sheets, thoroughly cleaned, may be prepared with Autotype waxing solution, French chalk or Albo. Sheets used before are best cleaned with benzine. Mounting is as in the carbon process, the celluloid and the soaked tissue being brought together under water, squeegeed firmly and left for at least twelve minutes between weighted blotting boards.

(4) *Development.*—Development is as in carbon, but should be very thoroughly carried out, and may take anything between five and ten minutes. Temperature at the start should be 95 to 100° F. Stripping should not be attempted until a corner lifts easily: if a corner bleeds when pressed down gently, it may be taken that the whole will strip pretty easily. After development the images may be hardened slightly in a solution of formaline.

(5) *Staining the carbon images.* The red and yellow dyes supplied for this purpose have been selected after long trials. Staining can be done as soon as the developed images on the celluloids have set in cold water. It is a good plan to have the dye solutions in two separate strengths, using the weaker in all ordinary cases and the stronger if the image is faint. After staining, the image is washed and hung up to drain. When the surface moisture has run off the celluloid is pinned down at the four corners with push-pins to a piece of blotting board, half an inch or so longer and wider, and left in a current of air to dry flat.

When both red and yellow transfer images are dry they can be assembled with clips on the blue bromide base, and the effect noted as regards colour balance. If the latter is correct, well and good. If either the red or yellow are weak, re-immersion in a stronger dye solution may improve matters. If too strong, transfer can be proceeded with, and some of the redundant colour taken off *after transfer* by squeegeeing the damped image in contact with a damped piece of Autotype single transfer paper.

(6) *Transferring the dyed images.* Either the red or the yellow image may be transferred first: usually the latter is better. The blue-toned bromide and the celluloid bearing the yellow image are soaked for about five minutes in cold water, taken out together, registered, squeegeed into contact, and hung up to dry. In warm, dry weather they should dry in about two hours. In damp weather very gentle heat may be used to assist drying after the first hour. When absolutely dry the print should peel off easily, leaving the celluloid quite clean. The surface of the print should now be rubbed over with a soft rag dipped in benzine to remove any trace of wax or of soapiness due to French chalk, and, when the benzine has evaporated, the print should be soaked in water for a quarter of an hour. At the end of ten minutes the red image is put in to soak for the remaining five minutes and transfer effected, as in the case of the yellow image. When the second drying is complete the finished colour print should peel off with a beautiful glossy surface. If the latter is at all defective, or if a matt surface is preferred, the print can again be rubbed over with benzine and soaked for a quarter of an hour in cold water.—B.J. "Colour Photography" Supplement, 1931, December 4, pp. 45-46.

AGFA AND FINLAY PROCESSES.

Factorial Development for Agfa Colour Plates.—Attention has been drawn by R. V. Sawyer to the simplicity of the development of Agfa colour plates by the factorial method.

An ordinary panchromatic green safelight is used in the dark-room lamp, but with a 60-watt bulb, care being taken always to use a standard light, otherwise the results will not be uniform. It is necessary to remain in the dark-room for sufficient time for the eyes to become accustomed to the light, before operations are commenced.

The clock is examined to ascertain the time that development is commenced, the plate is then placed in the Agfa M.Q. developer, and seconds are counted until the first appearance of the image. The number of seconds is then multiplied by a factor of 14, the product being the total time of development in seconds.

But if the image flashes up almost instantly, development is stopped at half a minute. If it appears in 10 secs., development for the factor time of 2 minutes 20 seconds is given. If it appears in 13 seconds, exposure is normal, and development of three minutes should be given. If 18 seconds

elapse, a development of 4 minutes 12 seconds is necessary, but if the image does not appear in 20 seconds, the plate is too under-exposed to be of any value.

As the time of appearance depends upon the transparency of the safelight and the sensitiveness of the eye, the factor of 14 may need modification in individual cases, but when the correct factor has been found no further alteration should be necessary.—*Amer. Phot.*, 1932, April, pp. 204-206.—*B.J. "Colour Photography"* Supplement, 1932, May 6, pp. 17-18.

Using Date-Expired Screen-Plates.—With Agfa or Autochrome screen-plates which have become stale by long keeping or by unsuitable storage it is found that plates often fail to darken in the second developing bath or give dichroic fog, local or general.

Dr. Thiem has traced these difficulties to the acid character of the residual chromium compounds left in the film by the reversing bath. He recommends a short immersion of the reversed plate in a weak solution of ammonia before the second development as solving the difficulty.

The procedure is therefore as follows: Reverse with bichromate bath, rinse under the spray until the yellow colour has cleared, then immerse in a bath of water mixed with a few drops of ammonia, rinse for one minute and then blacken for at least as long as the first development. This process greatly extends the life of screen-plates, for even plates which have passed their "expiry date" by more than a year can be developed to give good results free from dichroic fog.—*Phot. Rund.*, 1932, March, p. 97.—*B.J. "Colour Photography"* Supplement, 1932, April 1, p. 16.

Finlay Colour Process.—Bernard Wakeman has given many practical hints from his experience of the Finlay colour process.

Negatives of the requisite quality are the most important part of the process. They must be delicate, yet reasonably bright. The over-exposed muddy negative is almost useless, and so is the hard under-exposed negative. Exposure should be reasonably correct, and if that is so, over-development is the thing to be avoided.

Factorial development plus desensitising readily gives negatives of the desired quality. The plate is treated with Tabloid desensitiser, drained, rinsed and developed with Tabloid Rytol, viz., 1 pair of "tabloids" in 6 ozs. of water, using a fresh lot for each plate.

A factor of from 7 to 10, according to the contrast of the

subject, is used, the shorter factor, of course, for the more contrasty subject.

The filters supplied by the Finlay Co. for winter and summer sunshine, etc., are very useful. That marked "Diffuse or Dull" is a great help for subjects, including portraits, in poor light. This filter has been found most useful under conditions, for example, as those prevailing during heavy rain. Portraits taken in a conservatory under these circumstances with an exposure of 2 secs. at $f/4.5$ have come out reasonably well. Colours, if bright, were good, and even delicate colour was well rendered. But the dark quiet shades, e.g. the hair of the sitter, suffered in colour rendering.

In the positive transparencies from the negatives, the ideal is brilliance plus transparency. A rather greater deposit than for lantern slides is required. There must be *some* deposit even in the highest lights, but it is remarkable how little will produce colour.

The best developer for the positive plates is the hydroquinone-caustic recommended by the makers. It gives extreme brilliance. If there is any doubt, when development is nearly finished, that the required faint deposit in the lightest parts will be obtained, rinse the developer off and give the plate a final dip for a few seconds in dilute metol or Rytol developer until there is a light surface veil over the high-lights.

A certain amount of latitude is allowable in exposure of the positive plate. But much variation in the time of development leads to difficulty in judging the depth of image, for a fully-exposed and quickly-developed positive is apt to lose more in the fixing bath than a correctly-exposed and developed plate. Thus, in the long run, it is better to get suitable negatives than to doctor your positives in development. Aim at a positive exposure which will give complete development in two minutes. Bear in mind that slight under-development of the positive can be remedied by intensification with chromium, followed by amidol for re-development, but over-development cannot be satisfactorily remedied by reduction without serious loss of colour. Always judge the depth of your positive by a dark-room illumination of the same strength. A diffused light is much better than a clear glass of the necessary tint for use in judging. Then a word of warning must be given. If your dark-room illumination is at all strong, you will find the positive plates are not safe in yellow light. A 20-watt electric bulb may fog the plates when canary-yellow paper is used in front of it. But one thickness of the red or Rubra paper gives plenty of really safe light.—B.J. "Colour Photography" Supplement, 1932, June 3, pp. 21-22.

PROCESSING OF CINE FILMS.

Reversal Development of Pathex Film.—M. Gorrigue has described a method of controlled reversal development of Pathé 9.5 mm. cine-film for which doubled speed and an exposure latitude of the order of 1 to 8 with subjects of medium contrast are claimed. Uniform exposure throughout a film is secured by estimating the exposure with a photometer.

Development is done as follows:—

(a) Development is carried out on a drum rotated by a small electric motor in a developer in a flat dish. The drum and the motor are mounted together on a frame with a handle.

The developer is:—

Paraphenylene diamine	...	10 gms.	90 grs.
Soda sulphite (anhyd.)	...	45 gms.	400 grs.
Caustic lithia	...	6.8 gms.	60 grs.
Distilled water	...	1,000 c.c.s.	20 ozs.

The dish contains 900 c.c.s. (32 ozs.) of the following mixed bath:—

Used developer	...	750 c.c.s.	24 ozs.
Fresh developer	...	250 c.c.s.	8 ozs.

Filter through cotton wool just before use. After the complete treatment of 8.50 metres (27½ ft.) of film, 250 c.c.s. (9 ozs.) of the working bath are thrown away and replaced by fresh developing bath containing no bromide. The correct developing temperature of 72.5° F. is very important. The developing time varies from 4 to 12 minutes.

(b) The film is then washed for some few seconds before exposing to white light, viz., a 20 c.p. lamp at 3 metres (10 ft.) from the drum, so that the light-rays fall perpendicularly to the axis of the drum. Leave it washing thus for sixty seconds.

(c) Reversal is then carried out in a permanganate bath prepared just before use:—

Potass. permanganate	...	1.5 gms.	13 grs.
Sulphuric acid (pure)	...	10 c.c.s.	1½ drms.
Water	...	1,000 c.c.s.	20 ozs.

Time of treatment, 80 seconds; temperature, 50-60° F.

(d) Washing then follows for 60 seconds.

(e) Next comes clearing in a bisulphite solution, which can be used repeatedly. Leave for 30 seconds.

(f) Wash in running water for 4 minutes, taking care that the white light falls perpendicularly to the axis of the drum. The washing water may be of temperature from 43-59° F.

(g) For the partial second development, at once place the

drum back again in the developing bath already used. The temperature of the bath (72.5°F.) must be carefully observed and the direction of the light beam kept perpendicular to the drum.

The blackening of the image proceeds fairly rapidly. The treatment is to be stopped when the image appears harsh and dark enough as a transparency, and the diffused milky appearance very much weakened. The maximum time is 12 minutes. This gives an opportunity for the systematic correction of errors, either of exposure or of first development.

(h) After this stage, wash for 5 minutes and fix for 2-3 minutes in a weak hypo bath containing chrome alum and sodium bisulphite, filtered through cotton wool before use.

(i) Then wash for 10 minutes in running water and drain.

(j) Dry in a current of warm air just below the temperature at which gelatine melts. For this purpose use an electric heater adjusted by trial to suitable power.

(k) Wipe over with a chamois leather and edit: then the film is ready to project. If the film has been evenly exposed this procedure, properly carried out, will never give a failure.—Rev. Fran. Phot., 1931, Nov. 1, pp. 329-330.—B.J., 1931, Nov. 27, pp. 710-711.

Second Development by Sulphiding.—For avoiding dirty grey high-lights in 9.5 mm. cine-films developed by a simple reversal process, R. L. Boyd prefers a final brown image obtained by sulphiding.

The first development is with amidol developer, viz. :—

Soda sulphite, cryst.	...	3 ozs.	90 gms.
Amidol	...	80 grs.	5 gms.
Water	...	35 ozs.	1,000 c.c.s.

The film is exposed by aid of the Watkins meter so as to ensure as uniform exposure as possible. Then in the dark-room snip off three inches of the film, slip it into a bottle with the amidol developer (at 65°F.) and leave it for exactly 25 minutes. Then transfer the developed strip for five minutes to a reversing bath made up as follows :—

Potass. permanganate	...	$\frac{1}{4}$ oz.	6.2 gms.
Sulphuric acid (concentrated)	...	$\frac{1}{2}$ oz.	12.5 gms.
Water	...	40 ozs.	1,000 c.c.s.

In making up this bath, add the acid cautiously to the water first, then add the permanganate and leave to dissolve.

Finally rinse well and transfer the test strip to a clearing bath of sulphite for a few minutes, till it turns creamy white :—

Soda sulphite, cryst.	...	1 oz.	25 gms.
Sulphuric acid	...	$\frac{1}{2}$ oz.	6.2 gms.
Water	...	40 ozs.	1,000 c.c.s.

The film then gives an indication as to whether the given development (25 minutes) has been correct or not. If the film is nearly clear all over, the development was too long. If necessary, a second strip should be taken and developed for 15 or for 35 minutes, for example, according as a denser or a thinner image is desired. In this way the correct development time is found by trial.

The main length of the film is then wound on the frame and developed in a tank for the time found correct. The frame should be moved at least every five minutes. The film is then washed for seven minutes, reversed in acid permanganate and brought out into daylight. Seven minutes should be enough to remove all black deposit from the film. After rinsing, clearing in sulphite and washing again for ten minutes, the film is immersed in a freshly-made sulphide solution :—

Soda sulphide (50% sol.)	...	1 dram.	3.2 c.c.s.
Sulphuric acid, 10%	...	$\frac{1}{2}$ oz.	12.5 c.c.s.
Water	...	40 ozs.	1,000 c.c.s.

In this solution the film takes on a fine brown tone in less than five minutes. Twenty minutes' washing in running water finishes the film, which is wound on a drum for drying.

A film made by sulphiding has a more pleasing high-light tone and great latitude in density for projection, and is almost free from grain. The fact that the developed film is treated solely in acid baths tends greatly to keep the film from softening. —B.J., 1931, Dec. 4, pp. 724-725.

When sections of a film prepared in this manner are found to be too dark they may be remedied by the following treatment, also described by R. L. Boyd :—

A hardwood frame on which the film can be wound, leaving a clear view through the film, is required, and must be impregnated with melted paraffin wax before use. The dense parts of the film are cut out and wound on this frame, the ends being secured with drawing pins. A dish, in which the frame can be immersed, is filled with a solution made up by taking 2 ozs. of the permanganate reversing solution given above and adding 30 ozs. of water to it.

The film is kept moving in this diluted reversing bath for a minute. The film is then examined, preferably by daylight, when it will be found that some reduction has taken place. If not enough, return the film to the solution and examine every half minute or so. The action is very even and well

under control, but if the film is very dense, time can be saved by making the bath two or three times stronger to start with.

When film has had only slight reduction, it is only necessary to wash the film for 20 minutes and wind on the drum for drying, the film being carefully gone over with a wash leather before setting to dry.

With films that have received greater reduction, it is essential to wash for 10 minutes and then to place for 5 minutes in a 20 per cent. hypo bath acidified with metabisulphite. The film is then given a final wash for 30 minutes. It is surprising what good results can be obtained from under-exposed films in this manner.

If, on the other hand, a section of film has been over-exposed so as to give an image of thin and washed-out character, this can also be improved by treating the film before it has reached the sulphiding stage, viz., when it has been treated with sulphite and washed, bearing a creamy white image.

If on examination it is thought to be too thin to take a good colour in the sulphide solution, wind the film on the drying drum and let it dry, so as to harden it. The thin parts are now cut out and, when drying, or dry, freely exposed to strong light. The dried film, wound on to a frame, is immersed in the following solution :—

Formaline, 40% sol.	...	1 oz.	25 c.c.s.
Water	... ..	40 ozs.	1,000 c.c.s.

The film is allowed to remain in this solution for 10 minutes, and is then washed for 15 minutes. It is then transferred to the original amidol developer and allowed to remain there for 15 minutes. The film, thus completely developed, is given another wash of 15 minutes. The black image is next treated for a few minutes in half-strength uranium intensifier. This will bring the film up to projection density, and, if care is taken, the sulphide tone of the rest of the film can be fairly matched. A wash of not more than 10 minutes should be given after the uranium intensifier. The film is then wiped surface dry with chamois leather before drying.—B.J., 1932, Jan. 22, p. 48.



FOR STILL PHOTOGRAPHY.

(Cine Requisites see page 294.)

CHLORQUINOL DEVELOPER.

(Made by Johnson's & Sons, Ltd., Hendon Way, Hendon, London, N.W. 4.)

Photographers will certainly welcome the manufacture, by Messrs. Johnson, of this developer which formerly obtained very considerable popularity under the name of "Adurol." For Chlorquinol, of chlor-hydroquinone, as it may also be called, is a developer which comes more or less midway between the slow-acting developers, such as pyro and hydroquinone, and those of more rapid action, such as metol. Compared with hydroquinone it yields much softer results, and is much less affected by low temperature. At the same time, its keeping qualities in solution are excellent. A further feature, which recommends it to the maker of prints and lantern slides, is its good adaptability to the production of warm tones. Although Chlorquinol can be used in conjunction with a caustic alkali, it is best made up with soda carbonate or potass carbonate, and in this form, which is that recommended by Messrs. Johnson, develops with convenient medium speed and entire freedom from stain.

No doubt most users, however, will prefer to employ it in conjunction with metol, the combination forming a universal developer suitable for films, plates, gaslight and bromide papers. The following is the formula:—

Metol	...	...	16 grs.	1·8 gms.
Chlorquinol	...	...	48 grs.	5·5 gms.
Soda sulphite, cryst.	...	...	1 oz.	50 gms.
Soda carbonate, cryst.	...	...	1 oz.	50 gms.
Potass bromide	...	...	4 grs.	0·4 gm.
Water	...	...	20 ozs.	1,000 c.c.s.

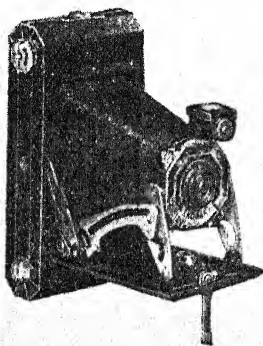
As is well known, a metol-hydroquinone developer is liable to vary in its effect according to the prevailing temperature, in consequence of the fact that at a low temperature the hydroquinone in the mixture becomes much less active. Hence the multiplicity of M.Q. formulae designed for use in warm or cold weather. The relative indifference of Chlorquinol to fall of temperature removes

this disability. Messrs. Johnson also give a formula for use of Chlorquinol alone specially for chlor-bromide papers and allowing of a good range of tones from warm black to sepia by direct development, with, of course, increase of the exposure for the warmer tones. Makers of lantern slides may use this formula for the warm tones so popular in lantern projection. Thus, in almost every branch of photography Chlorquinol is a valuable addition to the list of developers, and specially welcome at the present time, since it is entirely of British manufacture.

THE SIX-20 KODAK ROLL-FILM CAMERA.

(Made by Kodak, Ltd., Kingsway, London, W.C. 2.)

The Six-20 is made in the Kodak works at Harrow. It takes pictures of $3\frac{1}{4} \times 2\frac{1}{4}$ ins. size, and is of the slimmest and most pocketable dimensions. It measures $5\frac{3}{4}$ ins. in length, $3\frac{1}{2}$ ins. in



width and $1\frac{1}{2}$ ins. in thickness, and weighs only 17 ozs. On opening the camera, the lens is brought automatically into position for use. It is mounted on an octagonal panel which carries the diaphragm shutter. A feature of the latter is that the speed markings are engraved on the top of the shutter as well as on the front, so that the user has the speed marking in view when holding the camera in the ordinary way. This same facility, which may save many a wrong exposure, applies to the diaphragm aperture. The reversible brilliant finder is of a totally enclosed pattern for exclusion of dust, and the camera can be closed with the finder in either

position, a further point of advantage in quick operation of the camera.

The Six-20 is made in two models, one fitted with a doublet lens and the other with Kodak $f/6.3$ anastigmat. With the latter, focussing is done for distances down to 5 ft. by turning the front lens cell. At any time this model may be used as a fixed-focus camera by setting the lens aperture to $f/11$ and the distance scale to 25 ft.

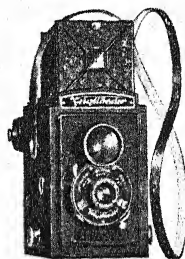
The hinged back immediately uncovers the spool holders, both of which are hinged for convenient insertion of the spools. These latter are of a new size and pattern exclusive to the Six-20, and provide eight exposures on either Kodak N.C. film or on the new Verichrome film. In the case of Verichrome the 8-exposure spool costs 1s. 2d., so that the user of the Six-20 gets two more exposures at the same price from each spool of Verichrome as compared with the use of Verichrome spools for six exposures (also 1s. 2d.) as used in other cameras.

Altogether the new Six-20 is a camera which is a delight to the eye and a further simplification of picture taking. In the model with doublet lens the price is £2 15s.; with $f/6.3$ anastigmat the price is £3 12s. 6d.

VOIGTLANDER BRILLIANT REFLEX TWIN-LENS CAMERA.

(Sold by Peeling & Van Neck, 4-6, Holborn Circus, London, E.C. 1.)

This new little camera is certain to be a great favourite with amateurs as soon as it appears on the market. It is for twelve pictures of $2\frac{1}{4} \times 2\frac{1}{4}$ in. size on the 8-exposure $3\frac{1}{4} \times 2\frac{1}{4}$ spool of film.



Its outside dimensions, not reckoning the projecting buttons and lenses, are less than $4\frac{1}{2} \times 3 \times 3$ ins. The picture is seen full size in a brilliant finder, which forms the upper part of the camera and is fitted with a lens of very large aperture. There is no focussing of the picture, but adjustment for subjects at different distances is very simply done by setting a pointer (attached to the lens) to one or other of three marks, viz., "landscape," "group," and "portrait." Loading of the film is extremely easy, since the supply spool is fitted into the bottom part of the camera and the take-up spool at the top,

where it is actuated by a large milled winding key. Back and bottom of the camera are provided with full-size light-tight doors for insertion of the film, and an indicator shows the number of exposures. With Voigtar $f/7.7$ anastigmat and two-speed shutter the price of this excellent little instrument is £2 10s.

ILFORD INFRA-RED PLATES.

(Made by Ilford, Ltd., Ilford, London.)

The remarkable photography which has been accomplished during the past few months by infra-red radiation gives additional interest to this notable advance in colour-sensitive emulsions issued by the Ilford Co. The Ilford Infra-red plates are a new distinctive product yet may be employed in the ordinary way by those exploring their many applications. As a rough idea of their speed in normal daylight, it may be said that an exposure of from one to two seconds is approximately correct for average subjects in bright sunshine with a lens aperture of $f/8$. Needless to say the "speed" with artificial sources of illumination is liable to vary enormously, according to the proportion of infra-red rays in the light emitted. As regards uses of this new plate it is unnecessary to say more here, since the reader can gather a fairly good idea from the article which appears earlier in these pages. It may be emphasised that Infra-red plates from their very nature are more susceptible to heat and other influences than are other plates, so that those in tropical countries proposing to make use of them should proceed with caution, since

otherwise they may be disappointed. Although requiring special treatment during exposure as regards the use of a filter, Infra-red plates may be developed by a greenish light which is of remarkable brightness and enables the plates to be developed by an illumination much more comfortable than any which can be used for panchromatic plates.

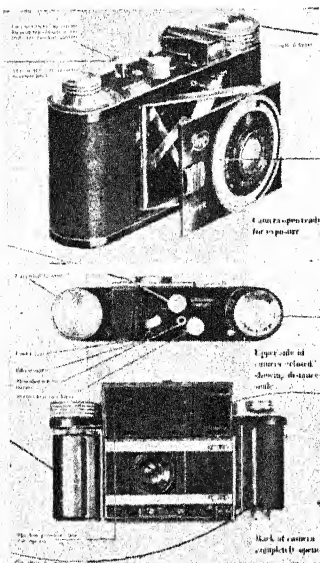
THE KRAUSS-PEGGY CAMERA.

(Sold by A. O. Roth, 85, Ringstead Road, Catford, London, S.E. 6.)

The small-film enthusiast could desire no more luxurious equipment than that provided by the Krauss-Peggy camera which makes 24×36 mm. negatives on 35 mm. negative ciné film. Every refinement is provided on the instrument, and the instant the small release is operated on the front panel, and the camera opens silently and automatically one feels instinctively that the other movements will be equally perfect.

The folded size of the camera is about $1 \times 5 \times 2$ ins., and its weight less than $1\frac{1}{2}$ lbs. Loading may be done either in daylight or in the dark-room, and although spools for the former purpose are slightly more expensive than the latter this convenience adds considerably to the attractiveness of the apparatus. However, the loading is so simple that no difficulty should be experienced even when loading panchromatic film in total darkness. The capacity of the camera is 5 ft. of film, thus making about 36 exposures. An added refinement is a cutting knife which operates by withdrawing a small knurled pin which serves to cut the film at any point.

Focussing is done from the top of the camera, upon which the film wind is also situated. One turn of this film-winding knob is sufficient to change the film, and any over-wind is effectively prevented by an automatic stop. A brilliant viewfinder is provided, and an automatic counter for indicating the number of exposures which have been made. The instrument is practically foolproof, for double exposures are impossible, as also are exposures which may be attempted when the film magazine is empty. Exposures without proper setting of the camera are also avoided and all adjustments



are made with the camera closed so that the exposure may be made the moment it is opened. A yellow screen is carried in the cap of the film-winding knob whence it may be extracted with ease when required. A special Compur shutter is fitted with automatic speeds ranging from 1 sec. to 1-300th sec., the action of the release being so sweet that the camera may be held sufficiently steady in the hand to secure exposures with the slowest of these speeds. The camera may be fitted with a variety of lenses, the price complete with a Zeiss Tessar $f/3.5$ of 50 mm. focal length being £22. With $f/2.7$ Meyer Makro-Plasmat, the price is £29 15s.

ILFORD HYPERSENSITIVE PANCHROMATIC PLATES

(Made by Ilford, Ltd., Ilford, London.)

It is only a few years ago that a photographer would think of panchromatic plates only when he had occasion to photograph some strongly coloured subject. But slowly the equally important merit of the panchromatic plate, namely that of greatly increased speed to artificial illumination of somewhat yellowish colour, has been recognised and utilised to his great advantage by the commercial photographer whose opportunities for business are enormously extended if he can do his work after dark without the nuisance of flashlight or the paraphernalia of portable electric lamps.

The new "Hypersensitive" panchromatic plates, recently introduced by Messrs. Ilford, Ltd., carry forward the facilities of the latter kind to which we have just referred by a further great step. Their speed must be ascertained by trial to be appreciated, and the result will surprise those accustomed to make exposures on the fastest plates hitherto obtainable. The plates are issued with H. and D. ratings of 2,500 to daylight and 4,000 to artificial lighting of the kind given by half-watt lamps. In this matter experience of what can be done is emphatically the best mentor, and the simple statement of what the plates will do is sufficient to show the new power which they place in photographers' hands. By way of seeing this for ourselves we made an exposure in an editorial room of the "B.J." lighted by a single 100-watt frosted electric bulb. The room, which had dark, dingy wall coverings, was darkened with an opaque blind, and exposure made at a lens aperture of $f/9$. An exposure of 6 seconds yielded a negative which is a good printer, whilst other exposures by artificial light showed the similarly short exposures which may be given. It will thus be seen that in many places where people congregate, and where the ordinary lighting is much better than that which we employed, and where also the lens can be used at a larger aperture, exposures can be made of a shortness which obviates the movement of figures in groups or of people at public dinners, meetings, etc.

It will, of course, be understood that the above-mentioned exposure was made without a filter, but an idea of the increase of exposure required when using filters will be gathered from the factors recommended by Messrs. Ilford, Ltd., viz., as follows :—

Alpha, $1\frac{1}{2}$; Beta, $1\frac{1}{2}$ to 2; Gamma, 3. Tri-colour Blue, 8; Tri-colour Green, 11; Tri-colour Red, $4\frac{1}{2}$.

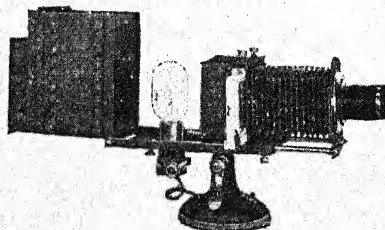
Treated with ordinary metol-hydroquinone developer the Ilford "Hypersensitive" reaches ample density in about 5 minutes in conjunction with a degree of contrast which denotes that it may be described as soft-gradation. Enclosed with each packet of plates is a table of approximate times of development by dish or tank, a time of 6 minutes at 65 deg. F. being prescribed for use of the Ilford pyro-soda or metol-hydroquinone developer of dish strength. In view of the very great sensitiveness we were struck by the cleanness of the negatives, the margins of the plates, where protected by the rebate of the dark-slide, being practically clear glass. Altogether the appearance of these new plates deserves to be ranked as an event of first rate importance not only to the professional photographer in and away from the studio, but to the amateur, to whom are opened new opportunities for work at home in the evenings.

The "Hypersensitive Panchromatic" emulsion is also obtainable coated on cut film, which form of the material will no doubt be preferred by many portrait photographers who have become accustomed to the use, handling and storage of film in place of plates. We should also add to this notice a word of caution respecting the keeping quality of an emulsion of this extreme panchromatic speed in trying climates. It cannot be expected that the emulsion will keep as well as those of more ordinary properties, and intending users in tropical and sub-tropical countries of this new remarkable material will be well advised to form their own knowledge of the degree to which the plates may be stored by trying out samples.

ENSIGN MAGNACAM ENLARGER.

(Made by Ensign, Ltd., 88-89, High Holborn, London, W.C. 1.)

This apparatus enables the amateur to make use of any focussing camera taking $3\frac{1}{4} \times 2\frac{1}{4}$ films, for enlarging. The camera is clamped



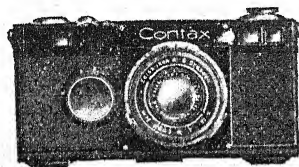
on to the front of the apparatus and focussing is done by means of the extension of the camera itself. The apparatus is made entirely of metal, finished in black ripple enamel, a separate internal metal lining with white heat-resisting surface being fitted on the inside. The rear of

the lamp-house is removable for fitting a "Fullolite," "Silvalux," or similar lamp of any wattage up to 100. The negative carrier is provided with masks for $3\frac{1}{4} \times 2\frac{1}{4}$ in., vest pocket, and 3×4 cm. sizes with a retaining strip for holding the negatives securely in position. The price, without lamp, is £2 12s. 6d.

CONTAX MINIATURE CAMERA.

(Made by Zeiss Ikon, Ltd., 37-41, Mortimer Street, London, W. 1.)

Beautifully made and finished, this little camera may be said to represent the very last word in miniature de luxe camera construction, besides which it embodies numerous and entirely novel features.



It is designed to take standard perforated ciné film, the mechanism for changing which is directly coupled with the spring tension of the shutter so that any chance of double exposures is eliminated. The film moves automatically to take up the next picture every time the shutter is wound. Sim-

ilarly to the standard roll-film camera, the film is wound from the spool on to an empty reel and thus passes the picture gate only once. Film packages may also be employed, however, which are entirely light-tight, so that they can be placed in the camera and removed in daylight. When using these cartridges it is necessary to re-spool the film back into the cartridge after it has been exposed, and for this purpose the camera is supplied with a re-spooling device.

A special feature of the camera is the direct coupling of the range finder with the focussing mount of the lens, the range finder as well as the shutter release being so designed that both may easily be operated with one hand. A most ingenious and robust all-metal focal-plane shutter is fitted to the camera. The lens is equipped with a bayonet mount, so that it may be easily removed in order that a telephoto lens may be substituted. Focussing is controlled by a milled disc situated on the top of the camera, an infinity catch being incorporated with it. An ever-ready case may be supplied which allows the camera to be used without removal from it. The price of this very beautiful little instrument when fitted with $f/3.5$ Tessar lens is £24 10s. The case is priced at £1 5s.

BARNET VERONA LANTERN PLATES.

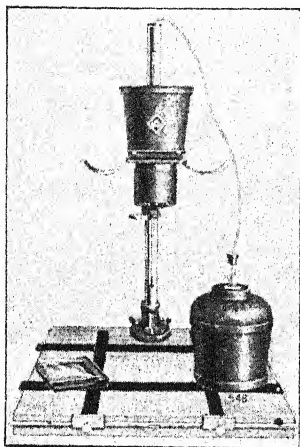
(Made by Elliott & Sons, Ltd., Barnet, Herts.)

Messrs. Elliott & Sons have made a welcome addition to their range of sensitive material by introducing a lantern plate prepared with an emulsion which is evidently somewhat similar to that used for their well-known chloro-bromide papers. The lantern slide maker is enabled to obtain with this plate, by direct development, rich sepia tones, of wonderful transparency and gradation. Exposure with an average negative at 6 ins. from a 32 c.p. lamp is about 45 secs., though red tones may easily be obtained by doubling the exposure and decreasing the time of development. If very red tones are required a still greater increase in exposure is made, development being, in this case, carried out with a diluted developer. A hydroquinone-caustic developer is recommended for the purpose.

THE PRAXIDOS ENLARGER.

(Made by Thorsch & Co., Ltd., 37, Bedford Street, Strand, London, W.C. 2.)

The Praxidos is a new enlarger of outstanding design, besides being beautifully constructed and finished. The lamp-house is mounted upon a tubular support on which it may be raised or lowered according to the degree of enlargement required, simply by means of compressing a clip and pushing the carriage in the required direction. Such excellent balance is maintained that no effort whatever is required to adjust enlargement to the exact dimensions required. Focus is continually maintained automatically by the action of a cam, which allows no deviation from the absolutely critical definition at all points of the travel of the carriage.



The Praxidos is made in two models, the first of which gives enlargements 2 to 10 times the size of the original negative, which may be anything up to 4×4 cm. The other model takes an original negative up to $2\frac{1}{2}$ ins. square, and will enlarge this from $1\frac{1}{2}$ to 7 times its linear dimensions.

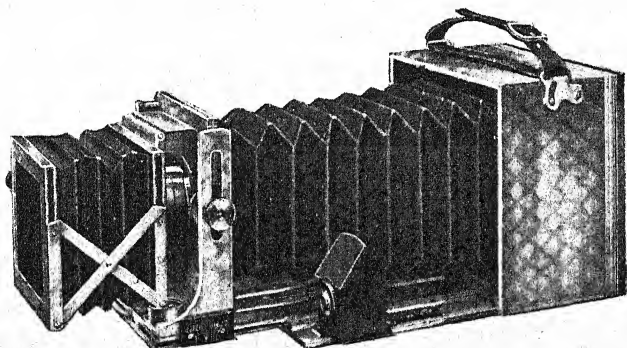
One of the features of the enlarger is that it may be used with or without a condenser at will. If soft enlargements are required a square of flashed opal is placed in position in front of the lamp. If more contrast is desired it is only necessary to remove the opal and substitute a single condenser of short focal length in the same position, an operation which is only the work of a few seconds. For normal work an opal bulb of 100 watts is supplied, but if it is always desired to use the condenser a suitable projector lamp of similar power may be substituted, in which case a double condenser is supplied and a somewhat larger lamp-house, which enables the lamp to be adjusted for maximum and even illumination.

Two designs of negative holder are supplied to enable either cut or uncut films to be used, and a mask is embodied in these of the size required to give a perfect white margin to the enlargements made. A switch and a red lens-cap are incorporated in the apparatus. Indeed, the whole equipment is so well thought out and so robustly constructed that it cannot fail to please even the most critical user. The price, with Meyer $f/3.5$ lens, is £12 10s. for Model No. 1, and £12 17s. 6d. for Model No. 2, which does not include the cost of the lamp.

THE SINCLAIR TRAVELLER UNA CAMERA.

(Made by James A. Sinclair & Co., Ltd., 3, Whitehall, London, S.W. 1.)

Every photographer must surely know the Sinclair Una camera of hand-stand pattern, and many must have envied those who possess an instrument of this admirable design and most excellent workmanship. The Traveller Una is perhaps less well known, as it is a later introduction which has hitherto not been reviewed in these pages. Nevertheless, it is a camera for the traveller and explorer which has proved its entire reliability and convenience on many expeditions. It is made in only one size, namely $3\frac{1}{2} \times 2\frac{1}{2}$ in. (9×6.5 cm.), and is entirely of Duralumin metal, nearly as light as aluminium, and of enormous strength. Outside dimensions of the Traveller Una are $4\frac{1}{2} \times 3\frac{1}{2} \times 4\frac{1}{2}$, and its weight is only 3 lbs., inclusive of lens and shutter. Yet the camera has double extension



(to 10 in.) and a range of movements such as rise of front, rotating back, and tilting baseboard for use with wide-angle lenses which fit it for every description of photography, both hand and stand. The lens fitted as standard is the Ross Combinable of $f/5.5$ aperture, and having elements which can be used as single lenses of long focus and $f/11$ aperture. The finder has a tilting movement showing the difference in subject when using the single or the complete lens and is also scaled to indicate the effect of using the rising front. The shutter is the Newman-Sinclair Perfect, giving speeds from $\frac{1}{4}$ -sec. to 1-100th sec. (in addition to time) and guaranteed, if customer wishes, for correctness of speed by the National Physical Laboratory. At long extension, as shown in the photograph, the lens front is as solid as a rock, and the instrument can be recommended to those wishing for a camera to withstand the roughest wear and tear and the most trying climates. Complete with above Ross lens, shutter and three double plate-holders, the price is £35.

THE AKRISKOP FOCUSING MAGNIFIER.

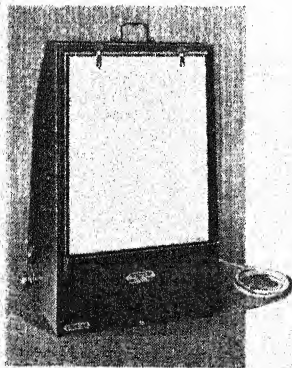
(Sold by Sands, Hunter & Co., Ltd., 37, Bedford Street, Strand, London, W.C. 2.)

This little instrument is designed to assist critical focussing when enlarging, and fulfils, in fact, for this purpose, the same function as the focussing magnifier which is used for negative work. The magnifier consists of a tube of which the end portion is cut away in order to accommodate a mirror set at an angle. The tube is furnished at the other end with a magnifying eyepiece, the whole device being mounted upon an inclined support so that the mirror is set at a suitable angle to the axis of the enlarger lens. In order to use the magnifier the eyepiece is first focussed on a cross-wire situated on the ground-glass. The magnifier is now placed upon the enlarging easel, when a portion of the projected image will strike the mirror and reflect it on to the ground-glass, where it may be viewed under considerable magnification. The focus of the enlarger is now adjusted until the visible portion of the image is needle sharp. For those who find difficulty in focussing their enlargements this little device should prove a great boon. The price of the Akriskop is £2 17s. 6d.

**ILFORD X-RAY VIEWING LANTERN.**

(Made by Ilford, Ltd., Ilford, London.)

This viewing cabinet provides a most useful means for the examination of X-ray photographs under the conditions so necessary for satisfactory diagnosis. The lantern is fitted with lamps which give remarkably even illumination, whilst the ventilation is such that the wet X-ray film is not liable to damage whilst being viewed. It is readily secured to the top of the frame by the clips seen in the photograph, and droppings from it are caught in a narrow trough arranged at the base of the viewing space. The cabinet is fitted with a plug socket, which allows of a second lantern being run from the one wall plug. For films up to 15 × 12 in., the price is £5 5s.; up to 17 × 14 in., £5 10s. These prices do not include the two 60-watt daylight lamps which are required.



THE WILLIAMSON PISTOL AIRCRAFT CAMERA.

(Made by the Williamson Manufacturing Co., Ltd., Litchfield Gardens, Willesden Green, London, N.W. 10.)

The latest product of the Williamson Manufacturing Co. is a new model of the "Pistol" aircraft camera which has been designed primarily for the use of the rapidly growing community of light aeroplane owners. The lack of rigidity of the ordinary hand camera makes it unsuitable for use in the air, and the "Pistol" camera is intended especially to overcome the disabilities associated with the ordinary type.

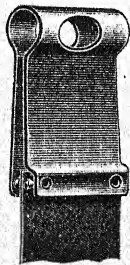


The instrument is constructed entirely of aluminium covered with a durable kryslac enamel, and is fitted with a $f/4.5$ Ross Xpres lens of 5.3 ins. focus. In addition to this, either the 10 in. Dallmeyer Dallon or the 13-in. Ross Teleros lens is interchangeable, or may be supplied separately if desired. The camera is fitted with the all-metal, ever-set louvre type shutter which has achieved such remarkable success on other models by the same firm. It is situated immediately behind the lens, but is independent of it, thus enabling a substitution of lenses to be made with the greatest ease. The shutter is adjustable for bulb exposures and possesses a full and accurate range of speeds to $1/2000$ th sec. Although the camera is normally used at infinity in the air, the lenses are fitted in a focussing mount in order that the camera may be adaptable also for use on close-up subjects on the ground. It is made in the popular $2\frac{1}{2} \times 3\frac{1}{4}$ in. size, and can be supplied to accommodate either plates, film-packs, or roll-films. The price with the Ross Xpres lens, six single slides, film-pack adapter, screen, and leather case is £25 complete.

DALLAN ROLL-FILM AND FILM-PACK CLIPS.

(Made by David Allan, Mansfield Street, Kingsland Road, London, E.2.)

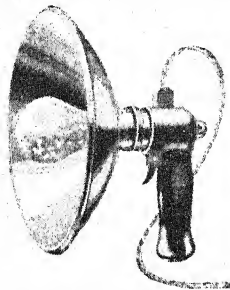
An entirely new design of clip for holding either roll-film or flat-film during processing operations has been placed on the market by Messrs. David Allan. The advantages of this clip over others is the fact that the film does not come into contact with the flat metal surface in any way. The edge of the film is placed upon two sharp metal studs and a compression of the clip between finger and thumb forces the points through the film and allows it to hang entirely clear of the metal surface of the clip. A slightly burred edge to the points ensures that the film will retain its correct position and will not slip into the tank during the progress of developing, etc. The clips are made in either stainless-steel at 7s. per doz., or nickel-silver at 4s. 9d. per doz. They require no cleaning.



SASHALITE FLASH-BULB APPARATUS.

(Made by Sashalite, Ltd., 28, Victoria Street, London, S.W. 1.)

The flash-bulb illuminant has now become so popular, on account of its high actinic light and "kindness" to those photographed that Press photographers and others who are in the habit of making



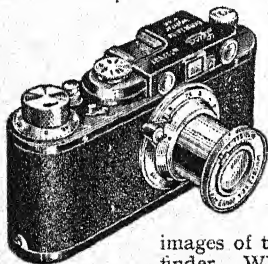
pictures which require instantaneous exposures at night would scarcely care to dispense with it. The Sashalite reflector is very beautifully made and comprises a handle, which contains the dry-battery, and is fitted with a trigger switch for firing the bulb. A green pea lamp is fitted at the back of the handle with an independent push switch for testing the battery and making certain of the ignition of the bulb. A plug is also fitted to the top of the handle to which a flexible

lead may be attached to enable the bulb to be fired from a distance up to 10 ft. by means of a pear push. A three-way adapter may also be supplied which enables bulbs up to three in number to be fired simultaneously. The unit may be obtained with a reflector of 11 in. diameter (price 32s. 6d.) or with one of 16 in. diameter at 37s. 6d. The three-way adapter costs 7s. 6d., and the remote control 4s.

THE LEICA CAMERA MODEL II.

(Made by E. Leitz (London), 29, Mortimer Street, London, W. 1.)

The wonderful little Leica camera has now come out in a new model, which does away with any uncertainty in getting sharp focus and provides this facility without added bulk and without



in any way reducing the scope of the camera. This has been done by making the rangefinder (or distance-measure) as part of the camera and connecting it to the focussing movement of the lens. With the Model II. Leica a user points the instrument so that he sees in the range-finder the object which is to be focussed sharply. He then operates the lever of the lens focussing mount so as to bring the two

images of the object into coincidence in the range-finder. When this is done, the object is automatically sharply focussed on the film. This coupling of range-finder and focussing mount is done by mechanism of extreme accuracy, so that the sensitiveness of the range-finder is fully equal to that of the Fodis supplied with the original Leica, although the base is only half the length. Moreover, the built-in range-finder of Model II. works with the same accuracy when using any of the

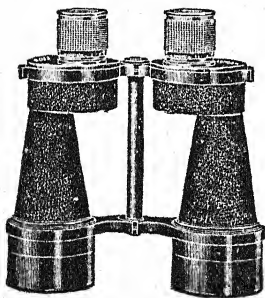
lenses of the Leica camera. These lenses have their focussing collars formed at the end as cams, which co-act with the lever of the rangefinder. The whole device is a beautiful piece of precision mechanism serving its practical purpose in the most admirable manner.

Leica Model II. also allows of the use of the various Leica accessories, the stereo attachment and angular view-finder being the only accessories which require new brackets. A new accessory, which is of particular value, is a prism which may be attached to the angular view-finder and enables subjects to be sighted and focussed whilst holding the camera at right-angles. The new Model II. Leica, with $f/3.5$ Elmar lens, is priced at £22.

ROSS PRISM BINOCULARS.

(Made by Ross, Ltd., 3, North Side, Clapham Common, London, S.W. 4.)

The Ross "Stepnite" stereo prism binocular has been specially designed for use at dusk, and for



observation at night. The transmission of light through the glasses is remarkable, and both central and marginal illumination is much higher than is usual with this type of binocular, perfect definition being maintained over practically the whole field, thus permitting objects to be picked up and clearly seen immediately they enter the field of vision. These qualities render the glasses of the utmost value to naval and military officers, as well as to the followers of every description of sport.

The magnification of the glasses is 7 diameters, and the real field of view 7 degs. The weight is just over 2 lbs., and the price £21 10s. 0d.

ILFORD X-RAY DENTAL FILM.

(Made by Ilford, Ltd., Ilford, London.)

The Ilford Dental Film for X-ray diagnosis of disease in teeth has now been put up in a new type of packing which renders it very convenient for use by the dentist and by those who carry out the development, etc. This packing is available in the $1\frac{1}{8} \times 1\frac{1}{4}$ in. size, with either single-coated or double-coated film, and also in the $1\frac{1}{4} \times 1$ in. size with double-coated film only. These small films are mounted, each pair in a little light-tight envelope of pebbled paper containing also a highly flexible piece of thin metal (the same size as the film), which allows the whole to be readily adapted to the shape of the patient's jaw. After exposure the package is readily torn open for development and fixing in the usual way. The Dental Film is supplied in this form in boxes containing two dozen (pairs) of the film.

KENTMERE K. G. GASLIGHT PAPER.

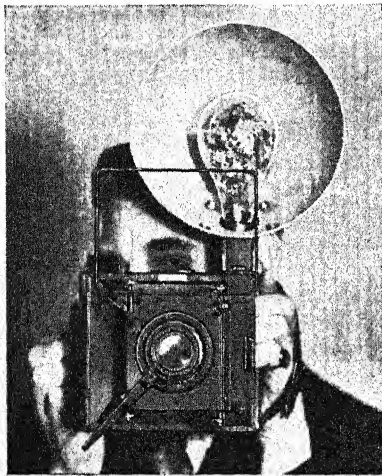
(Made by Kentmere, Ltd., Staveley, Westmorland.)

Specially suitable for the D. & P. trade "K.G." gaslight paper is designed to give maximum contrast without the loss of detail. It has great latitude, is very fast, and even with flat negatives it gives pure whites and rich deep blacks, at the same time preserving excellent gradation. It is made in single or double-weight, in glossy, carbon, and matt surfaces, and it may also be obtained on a cream base if required. The paper may be used with perfect safety in diffused artificial light, and it should meet all the requirements of those engaged in the D. & P. business.

ROTH SUPER-SPEED PRESS CAMERA WITH SYNCHRONISED BULB-FLASH.

(Sold by A. O. Roth, 85, Ringstead Road, Catford, London, S.E. 6.)

The introduction of a model of the Roth Super-Speed press camera embodying successful synchronising mechanism for flash-bulb exposures is a practical improvement of the utmost importance to the Press photographer.



In the new Roth camera the synchronisation is very neatly achieved. The mechanism is entirely enclosed, either in the body of the camera or of the bulb-holder, so that in daylight the camera is operated just like an ordinary model. The only external additions are a guide piece for attachment of the box base of the bulb-holder, and a small brass stud to form a contact. The flash-bulb is mounted, as the illustration shows, in an 8-in. aluminium reflector on the camera. The reflector is attached to a box-like base which slides into the guide pieces on the camera top. The box contains three little

batteries (6-volts), which serve to ignite the bulb. With the shutter wound, and the bulb-holder pushed right forward so as to meet the contact on the camera, things are in readiness for exposure. To make sure of the electric circuit, it is only necessary to touch a button on the bulb-holder: a small pilot bulb lights up and shows that the battery is in order. Then, at a touch of the release, the shutter drops, the flash fires and the picture is secured. With a

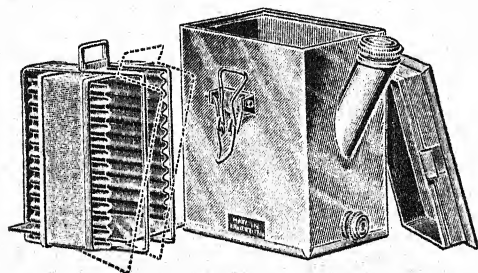
rapid re-wind, the insertion of a new bulb and a quick movement of the changing box, the apparatus is ready for the next subject in a few seconds.

Apart from the use of a flash-bulb the Roth Super-Speed Press camera is made to meet every Press requirement. Its robust build qualifies it for years of hard service: its rigid construction permits the use of the heaviest $f/3$ lenses, and there is a remarkable range of shutter speeds with beautifully sweet "slow-drop" and "bulb" exposures, in either non-capping or self-capping patterns. It is made in the one size of 9×12 cm., with Meyer $f/3$ or $f/4.5$ lens of 6 ins. focal length as standard equipment. Either double dark-slides or excellently made automatic changing boxes for twelve plates can be supplied.

DALLAN ECONOMIC DEVELOPING TANK.

(Made by David Allan, Whitfield Works, Mansfield Street, London, E. 2.)

This improved model of a well-known series of tanks is constructed of solid nickel silver and is designed to develop any number of plates or films from 1 to 12. These are held in a rack which may



be provided with suitable sheaths to hold flat films, and after this rack is loaded and placed in the tank a hinged cage is clipped across the top to keep the plates or films safely in position whilst developing is

proceeding. The usual Dallan principle is utilised for filling the tank through an aperture provided for the purpose, after the tank has been loaded and closed, and a drain plug is fitted at the bottom of the tank which may be removed for washing purposes. The tanks are made to accommodate plates or films of practically any standard size, the prices ranging from 20s. for the $3\frac{1}{2} \times 2\frac{1}{2}$ ins. size to 30s. for the half-plate size.

JOHNSON'S CONCENTRATED DESENSITISER.

(Made by Johnson & Sons, Ltd., Hendon Way, Hendon, London, N.W. 4.)

The increasing popularity of highly sensitive panchromatic emulsions is encouraging many workers to avail themselves of desensitisers. The use of the concentrated solution made by Messrs. Johnson & Sons greatly simplifies matters and makes the compounding of a difficult solution unnecessary. The plate is immersed in the diluted solution, containing one part in four, in complete darkness for a couple of minutes, after which development may be carried out in weak artificial light. The diluted solution may be used repeatedly if kept in the dark.

ILFORD STRIPPING PAPER.

(Made by Ilford, Ltd., Ilford, London.)

A form of sensitive material which lends itself to many uses, not only in photo-mechanical work, but also in ordinary photography, has been introduced by the Ilford Co. as the Stripping Paper or Strip Film. It is an emulsion-coated paper provided with a non-halation backing, so that the effect of scatter of light and re-reflection in the paper base is obviated and thus qualifies the material for the making of negatives of fine line subjects where the sharpest definition is of the utmost importance. The paper is developed in the usual way and obtains ample vigour and contrast in a metol-hydroquinone developer. After a rinse and short immersion in a 5 per cent. bath of acetic acid it is again rinsed and fixed in the ordinary bath of hypo and potass metabisulphite. When dried, after a final wash, of about half-an-hour, the emulsion film is readily stripped off by gently detaching the film at one edge and steadily drawing the film off its paper support. The film is of substance quite thick enough for handling and may be readily cut to any desired size. It may also be firmly mounted on glass by previously giving the latter a coating with a weak solution of gelatine.

JOHNSON'S COPPER INTENSIFIER.

(Made by Johnson & Sons, Ltd., Hendon Way, Hendon, London, N.W. 4.)

A copper intensifier which may also be used for the toning of bromide and gaslight prints and lantern slides is now obtainable from Messrs. Johnson & Sons in powder form. One operation only is required, and the results obtained with it are quite permanent. A solution, green in colour, which will keep in good condition for several days, is made by dissolving 40 grs. of the powder in 2 ozs. of water. After thoroughly fixing and washing the negative it is immersed in the solution until sufficient density is obtained, after which it is washed in running water and dried in the usual way. For toning, the well-washed print or slide is placed in the solution when the colour will change to purple or red according to the time given. When the required tone is reached the print is removed from the solution, washed, and dried.

THE KANDEM SPOTLIGHT.

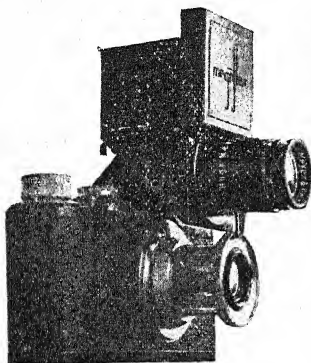
(Made by Kandem Electrical, Ltd., 711 and 715, Fulham Road, London, S.W. 6.)

A new production is a spot light of excellent design and appearance made upon the same solid lines which characterise all the equipment turned out by this house. Mounted on a substantial stand 4 ft 6 ins. in height, with an adjustable extension to about 12 ft., the lamphouse, which is fitted with heavy knurled screws for angular adjustment, is solidly constructed and well ventilated, and is fitted with a lens of 110 mm. diameter. The gas-filled lamp of 500-watts which is provided is mounted upon a sliding base which may be adjusted to any position in the lamphouse. The back of the lamp itself is silvered, in order that this may act as a reflector, thus giving a light of high efficiency. The price of the lamp complete is £6 2s., or without stand, £4 10s.

THE MEGOFLEX CRITICAL FOCUSSER.

(Sold by A. O. Roth, 85, Kingstead Road, Catford, London, S.E. 6.)

This excellently-made accessory is an attachment for cameras such as the Leica, Peggy, or Zeiss Ikon Contax, taking 36 pictures on a length of standard cinematograph film. It is made and



designed by the well-known firm of Hugo Meyer & Co., of Görlitz, in slightly different patterns for use, with one or another of the above instruments, as a finder which also shows the full-size image obtained with the camera and, furthermore, allows of the critical focussing of this image by operation of the lens of the camera proper.

The Megoflex weighs only 6 ozs., and may readily be carried in the pocket, since it measures only about $1\frac{1}{2} \times 1\frac{1}{2} \times 3\frac{1}{2}$ ins. when folded. It is attached to the camera in a few seconds, and, for practical purposes, converts the latter into a reflex instrument. Moreover, the construction of the Megoflex allows of

its being used both at the eye and waist level, and it may also be adjusted so that the photograph is taken in a direction at right angles to that in which the camera is pointed, thus allowing of many very close subjects being photographed without the fact being suspected. Particularly for close-up pictures the Megoflex is a little piece of high-class optical apparatus which will be fully appreciated by users of miniature cameras. The price is £5 15s.

VOIGTLANDER PERKEO 3 × 4 c.m. CAMERA.

(Sold by Peeling & Van Neck, 4-6, Holborn Circus, London, E.C. 1.)

This most pocketable of film cameras takes 16 pictures of 3×4 cm. size on a vest-pocket spool of film. It measures almost exactly $4\frac{1}{2}$ in. long, $2\frac{1}{4}$ in. wide, and about $1\frac{1}{4}$ in. in thickness,



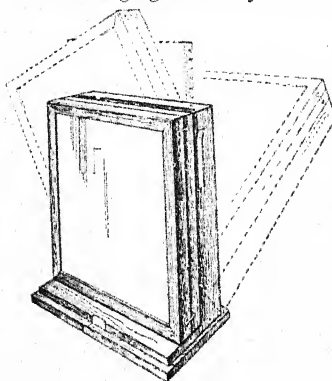
plus the projecting winding keys and film-holder studs. On pressing a button, the base-board springs out into position for use, and this movement can be done whatever the setting of the camera for distance by means of the scale provided on one side of the instrument in the form of a circular key similar to that for winding on the film. The camera is fitted with $f/3.5$ Skopar anastigmat in Compur shutter at the price of £11 10s., but may be obtained in cheaper models from

£7 12s. 6d. Altogether a most compact and efficient little camera for pictures of the popular 3×4 cm. size.

SALEX ENLARGING EASEL.

(Sold by City Sale & Exchange Ltd., 59, Cheapside, London, E.C. 2.)

This enlarging accessory has been brought out specially for use of those making enlargements of moderate size from the small negatives at present popular. Its construction is shown in the drawing, from which it will be seen that the paper holder, fitted with best quality glass front, can be raised and lowered and also rotated, thus providing for exact placing of the picture. The easel also turns down flat for ready insertion of the bromide paper, and the spring back on which the paper is laid ensures perfect contact of the sensitive surface with the glass. Of size to take bromide paper up to 12×10 in. the price is £1 10s.

**PHOTOGRAPHIC PUBLICITY PRINTING.**

(Lilywhite (1932), Ltd., Mearclough, Sowerby Bridge, West Yorkshire.)

As an illustration of the advance in popularity of real photographs for advertising purposes, calendars, and postcard views, as well as reproduction printing in various processes for the same purpose, Messrs. Lilywhite, Ltd., send us some very excellent specimens of work turned out from their Yorkshire works. Among these specimens are some really good examples of the Collogravure process which the firm has recently perfected. The cost of view postcards printed in this process is less than that of real photographic cards, and the firm undertake to send their own photographers to secure original negatives if required.

SICKLE JUNIOR ENLARGER.

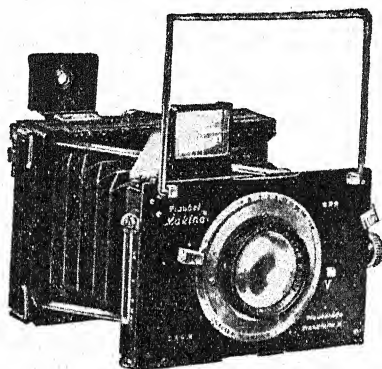
(Made by O. Sichel & Co., 52, Bunhill Row, London, E.C. 1.)

The vertical enlarger of this well-known make for negatives up to $4\frac{1}{2} \times 3\frac{1}{2}$ in. has been improved in the latest model by the provision of a negative carrier which considerably extends the scope of the apparatus. The carrier now slides through the body of the camera and allows of film negatives up to $3\frac{1}{2}$ in. in width being passed through without cutting. Small film negatives, such as the Leica and those of half vest-pocket size, may thus be conveniently handled intact. Enlargements may be made up to 5 diameters, but for very small negatives a lens of shorter focus can be fitted giving a considerably greater degree of enlargement. The postcard model can also be adapted for small negatives. In the quarter-plate size the price is £13 10s. ; in postcard, £18 10s.

PLAUBEL MAKINA AND MAKINETTE CAMERAS.

(Sold by Wauckosin & Co., Frankfort-on-Main, Germany.)

These most compact and popular cameras have been improved



in various respects since last noticed in these pages. The Makina is for $6\frac{1}{2} \times 9$ cm. pictures, and is fitted with the $f/2.9$ Anticomar Plaubel lens for use with either plates or film-packs. The Makinette takes 16 pictures of 3×4 cm. size on a $4 \times 6\frac{1}{2}$ cm. spool of roll-film and is of extraordinarily small dimensions. It is fitted with $f/2.7$ Anticomar lens and Compur shutter, and like the Makina is a camera of high-class construction.

BUTTERFLY WING PICTURES IN RELIEF.

(Made by Bennett & Jennison, Ltd., Ladysmith Road, Grimsby.)

A most exceptional and attractive novelty in pictures is a new departure with this firm, which has in the past introduced many saleable lines in frames, mirrors, screens, etc. The pictures described as "Butterfly Wing" are works in colour ranging in size from about 8×8 in. to 4×4 in. The subject is shown in relief, obtained apparently by applying parts in a plastic material or by pressing parts of the composition from behind. At any rate, the effect is most striking and quite in accordance with modern preference for something out of the common. The pictures also include other parts produced in highly lustrous coloured foil, and it is these which give the vivid effect similar to that of a butterfly's wing. Messrs. Bennett & Jennison have a score or more of stock subjects produced in this style, and at prices ranging from 7s. 6d. to £6, inclusive of handsome black ebony frames. They are able to reproduce any work in this style, and a photographer who wishes to show his customer something quite unique in the way of a de luxe "reproduction" of a photograph should obtain particulars of this new style. It would be well to submit prints, since it is not every subject which lends itself to this process.

WESTMINSTER PAPER FRAME FOR ENLARGERS.

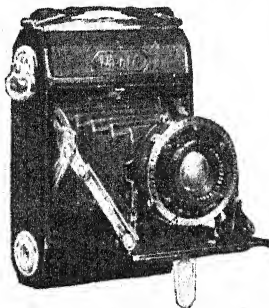
(Made by Westminster Photographic Exchange, Ltd., 119, Victoria St., London, S.W. 1.)

This stoutly made paper holder keeps the bromide paper perfectly flat under a glass screen and facilitates the use of a vertical enlarger as it dispenses with all pinning or other attachment of the paper. It is made to take papers up to $8\frac{1}{2} \times 6\frac{1}{2}$ in., and is ruled with rectangles down to $3\frac{1}{2} \times 2\frac{1}{2}$ in. as guides when arranging the size and margins of the projected image. The price is 15s.

THE IKONTA 520 FILM CAMERA.

(Made by Zeiss Ikon, Ltd., 37-41, Mortimer Street, London, W. 1.)

A still further model has been added to this popular range of cameras by the introduction of the 520 model which takes 16 4.5×6 c.m. pictures on a $3\frac{1}{4} \times 2\frac{1}{4}$ in. roll-film. It possesses all the desirable features of other models of the same name, such as self-erection, extreme rigidity, and complete metal construction. The back opens on a single hinge by means of an easily operated catch on the top of the camera, and loading thus becomes a very simple operation. The camera may be obtained with $f/4.5$ Tessar and Compur shutter at £10 5s., with $f/6.3$ Novar in a Derval shutter at £4 10s., or with $f/4.5$ Novar lens and delayed action Telma shutter at £6.

**ILFORD DOUBLE X-PRESS PLATES.**

(Made by Ilford, Ltd., Ilford, London.)

The well-known Ilford Press plate of extreme speed, contrast in working and quickness in development, fixing and drying, has been supplemented by another, the "Double X-Press" similar in the above respects, and with the addition of pronounced orthochromatic sensitiveness. Press photographers of late have shown more regard for obtaining good colour-rendering in subjects which they put out for the favours of art editors, and the new Ilford plate enables them to do this without sacrifice of the elements of speed in the exposure of the plates and, what is more important, in the subsequent treatment. The new plates are rated at 1,500 H. & D., and readily give density in either pyro-soda or metol-hydroquinone developer. For extra vigour the makers' metol-pyro developer is recommended.

FLAT TELESCOPIC TRIPOD.

(Sold by Sheffield Photo Co., Ltd., 6, Norfolk Row, Sheffield.)

This tripod folds flat, and when packed in its well-finished leather carrying case measures only 9 ins. long, $2\frac{3}{4}$ ins. wide and $\frac{3}{4}$ ins. thick, thus allowing it to be carried in the pocket quite conveniently. The tripod is made both in brass and also in a hardened alloy, the latter being very much stronger than an aluminium tripod, although retaining the same wonderful lightness. The tripod extends from 9 ins. to 4 ft. when fully extended, and is exceptionally rigid when in this latter position. The price of the brass model is 22s. 6d., and the lighter one 27s. 6d. The Sheffield Photo Co. have recently made extensive additions to their premises to cope with the increasing demand for all ciné and other apparatus of the sort described above.

THE LEICASCOPE EXPOSURE METER.

(Sold by Drem Products, Ltd., 37, Bedford Street, London, W.C.2.)

The makers of the popular Justophot exposure meter have brought out a pattern of this convenient type of instrument specially designed for use with the Leica camera, that is to say, the dia-



phragms or f /Nos. are those of the Leica, viz., $f/1.3$, $f/1.9$, $f/2.5$, $f/3.5$, $f/4.5$, etc. The Leicascope is exceedingly simple in use. When working without a filter the O on the red patch of the second ring from the eye-piece is set opposite to the Scheiner speed of the plate or

film. A table in the instructions gives the equivalents of the Scheiner numbers in terms of H. and D. Thus, for a plate or film of 650 H. and D. the O would be set opposite 20 on the Scheiner scale. When a filter is being used all that is necessary, in order to make allowance for it, is to set the filter factor, viz., 2, 3, and so on, instead of the O, against the Scheiner number. When this adjustment has been made, it is not altered so long as film of the same speed is being used. For making a test for ascertaining the exposure the ebonite eye-piece is pulled out so that the user's eye can see sharply the two discs in the field of the instrument, viz., 1 (white) and 2 (green). The large milled end of the meter is then turned until the bold black arrow on the scale attached to it comes opposite the similar arrow on the scale next to the eye-piece. The meter is then pointed to the subject, and the milled end slowly turned (it will turn only one way). As this is done, the No. 2 or green disc becomes fainter and fainter until it entirely disappears. When this point is reached the exposure for any stop from $f/1.3$ to $f/36$ is given on the time scale next to the milled end of the meter. The Leicascope is supplied complete in leather case, price 30s.

SALEX FOLDING POCKET CAMERA.

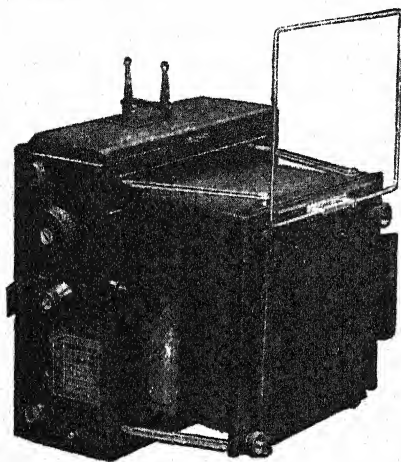
(Sold by The City Sale & Exchange, 59, Cheapside, London, E.C.2.)

Another addition to this well-known range of cameras is a little folding type which is designed to take $3\frac{1}{2} \times 2\frac{1}{2}$ ins. plates, roll-films, or film packs. Light and compact, the camera is undoubtedly of very fine value, and is splendidly finished with fine-grained leather covering and bellows. A double extension of some 10 ins. is provided for the 105 mm. $f/3.8$ Salexon anastigmat lens which is fitted, thus allowing the camera to be used for copying if desired. A delayed-action Compur shutter with speeds from 1 to $1/250$ th sec. as well as time and bulb exposures, is fitted, and both brilliant and direct vision finders are provided. It will be seen from this specification that the camera is suitable for the serious worker, and is capable of being used for practically any type of work. The price, including three single metal slides, is £6 17s. 6d.; roll-holder, 15s. extra, and film-pack adapter, 8s. 6d.

THE SOHO PRESS CAMERA.

(Made by Soho, Ltd., 3, Soho Square, London, W. 1.)

Sturdily built and remarkably rigid in the opened position, this camera is suitable for all-round focal-plane work. The non self-capping shutter is similar in many respects to that fitted to the



Soho reflex. The speeds, which range from 1/10 to 1/1,000 sec., are regulated by spring tension and width of slit. To obtain a given speed the shutter is half wound, and the tension is set, according to the scale plate fixed on the side of the camera. The shutter slit is then altered to the requisite width by means of a small knob, the winding is completed, and the shutter is then ready for action. A full-size direct view-finder is fitted to the camera and is most convenient in use. A good feature of the camera is that it can be used either for 5 × 4 in.

work or 9 × 12 cm. For the 5 × 4 size it is provided with double block-form slides, but when required for 9 × 12 plates an adapter may be fitted to take single metal slides. The price of the camera with three block-form slides, 5 × 4 in., is £18 10s., without lens, the same price being charged for it when it is adapted for the 9 × 12 cm. size, in which case six single slides are supplied.

AGFACOLOR FILMS.

(Made by Agfa, Ltd., 1-4, Lawrence Street, High Street, London, W.C. 2.)

Sensitive material for working the well-known Agfa colour process is now available, coated upon roll-film, film packs, or flat-film, and in any of these convenient forms results may be obtained equal to that with plates. Both film-packs (which normally contain six films) and roll-films are loaded into the camera in daylight in the usual manner, but the flat film is packed separately in paper folders with the emulsion side covered with a card, the two being placed in the cassettes together. The separate pictures on the band of film on the spool are denoted by five notches on the edge of the film, so that development of each exposure may be done separately after cutting the film at these points. The extreme compactness of this material should influence many photographers who have not hitherto taken up colour work to do so now.

WATER COLOUR PAINTINGS OF DOGS.

(Sold by Rudowskys', 48, London Wall, London, E.C. 2.)

Rudowsky's, the well-known specialists in backgrounds, mounts, albums, sensitive materials, etc., have recently introduced a line of water colour paintings of dogs, which are executed by their own artists on such articles as match-slides, cigarette boxes, playing-card boxes, etc. The work is carried out by experts in animal painting, and the results are extremely effective. The paintings are done from photographs—either studio or outdoor—these being used purely as a guide and not as a base. Photographs are also done for the trade from a stock collection of photographs of nearly every known breed of dog. The price for original studies from customers' own photographs ranges from 3s. 6d. to 9s. 6d.

KINDERMANN JUNIOR GLAZING MACHINE.

(Sold by R. F. Hunter, Ltd., Celfix House, 51, Gray's Inn Road, London, W.C. 1.)

Owing to the success of the larger Kindermann glazing machines Messrs. R. F. Hunter are now marketing a junior model at much lower prices. This machine is solidly constructed and consists of an electrically heated base with a slightly convex surface, on which the chromium plates containing the squeezed prints are placed, face up. An absorbent band of fabric, which is fixed to one edge of the glazer, is then stretched tightly over the plate by means of a tension lever, and the prints are allowed to remain on the glazer for 3 to 4 minutes. Upon raising the fabric, the prints will be found dry and detached from the plate with a very high gloss, whereupon another plate is inserted and the action repeated. The chromium plates supplied with the glazer are of high quality, being made of solid brass throughout and chromium plated by a special process. The glazer may be obtained in three sizes capable of accommodating 12, 25 and 42 $3\frac{1}{2} \times 2\frac{1}{2}$ in. prints per plate respectively, the prices being £2 15s., £4 and £8.

STONEWARE DEVELOPING TANKS.

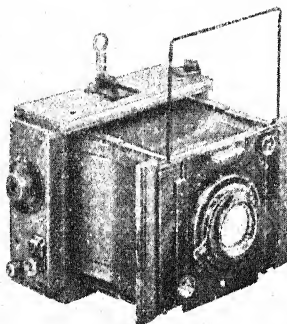
(Made by the Hathern Station Brick & Terra Cotta Co., Ltd., Loughborough.)

Tanks for D. & P. work are a feature of the products offered by this firm who specialise in a stoneware tank 47 ins. deep and $8\frac{1}{2}$ ins. square, inside measurements. This tank has recently been increased in depth in order to enable it to accommodate film of any standard length, and its present capacity is about 11 gallons of solution. It is provided with six grooves across the top, thus permitting six rods to be used, each of which is capable of holding three $3\frac{1}{2} \times 2\frac{1}{2}$ in. roll films and, in consequence, allowing 18 films to be handled at once. An overflow outlet is provided just underneath the rim, and about $1\frac{1}{2}$ ins. from the top of the tank, to prevent overfilling, and a well-glazed and finished stoneware tap is provided at the bottom outlet to facilitate emptying and cleaning. An alternative to the tap is a rubber plug which reduces the price of the tank from £2 18s. 0d. to £2 10s. 0d. Although normally supplied of brown stoneware, well glazed both inside and out, the tank can also be supplied in white glazed ware at slight extra cost.

V.N. FOCAL-PLANE PRESS CAMERA.

(Made by Peeling & Van Neck, Ltd., 4-6, Holborn Circus, London, E.C. 1.)

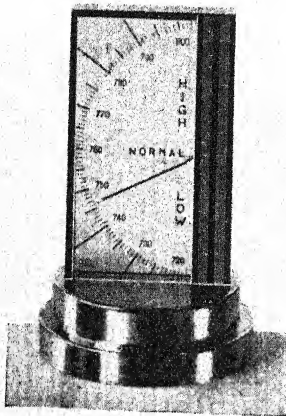
This excellent camera for Press photography is made in one size only, namely, 9×12 cm., and for use with single metal dark-slides. The lens front extends most rigidly on struts of the usual pattern and will take an $f/3.5$ 6-in. lens, though the lens fitted as for standard is the 6-in. $f/4.5$ Dallmeyer anastigmat. There is about half-inch rise and fall, and about half-inch cross movement; also wire frame finder, with sight which is adjustable for compensating for the difference in view point between finder and lens when photographing objects at 2, 3 or 5 yards. The focal-plane shutter is of the non-self-capping type, of quick wind and very quiet in use. Width of slit is very quickly altered, and at the full width the shutter can be used for time exposures by keeping the release pressed. For longer exposures a cap on the lens is used. Of most substantial construction the camera with $f/4.5$ 6-in. Dallmeyer lens in focussing mount and six single metal slides is priced at £37 10s.



ZEISS TABLE BAROMETER.

(Made by Carl Zeiss (London), Ltd., 37-41, Mortimer Street, London, W. 1.)

Apart from optical and photographic instruments of every description the firm of Zeiss have a world-wide reputation for many other instruments of precision, of which the recently produced table barometer is a typical example. Highly finished in chromium plate, $6\frac{1}{2}$ ins. in height overall, the instrument is artistically modern in design and most beautifully finished. As will be seen from the illustration, the dial is engraved on glass in figures which may be seen without difficulty, a diffusing screen being placed at the back of the indicating pointer which provides an excellent background. The dial alone is 5 ins. high and 3 ins. wide, the usual setting pointer being provided, together with a simple adjustment for correcting the instrument for local altitude. As a precision instrument and an artistic addition to the writing table the barometer is moderately priced at £3 3s. 0d.



JOHNSON'S CONTRAST DEVELOPER.

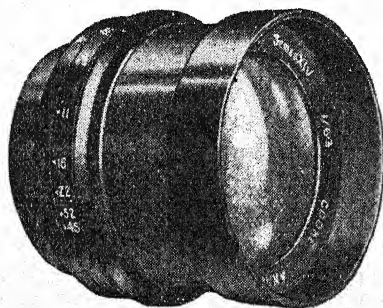
(Made by Johnson & Sons, Ltd., Hendon Way, Hendon, London, N.W. 4.)

Johnson's "Contrast" developer will be specially welcomed by Press, X-Ray, and commercial workers, for it is a powerful and quick-acting solution, giving the utmost brilliancy in negatives or prints. It is sold in concentrated form, and for use all that is necessary is to dilute it with four times its bulk of water, or for softer results a dilution up to nine times. A great advantage of using a developer of this sort is that of always having a solution ready for use which may be relied upon to complete the process of development in the shortest possible time. It is especially useful, for rush jobs of any description.

COOKE SERIES XIV F/6.3 LENSES.

(Made by Taylor, Taylor & Hobson, Ltd., Stoughton Street Works, Leicester.)

The growing use of panchromatic plates and film for all types of photographic work has necessitated the production of the Cooke Series XIV anastigmat lens which is of relatively long focus and



is especially suitable for portraiture with these plates, as well as for group work and for colour-separation negatives from life or other originals. They are of the three-glass type and are intermediate between process and portrait lenses.

The new super-sensitive panchromatic material does not require the large aperture so essential for certain types of work, and assisted by this fact,

Messrs. Taylor, Taylor & Hobson have been enabled to produce this lens which focusses all colours with critical sharpness and uniform size of image on all types of sensitive material. The 13-in. Series XIV. $f/6.3$ Cooke lens is priced at £17.

PARVUS TABLE TOP TRIPOD.

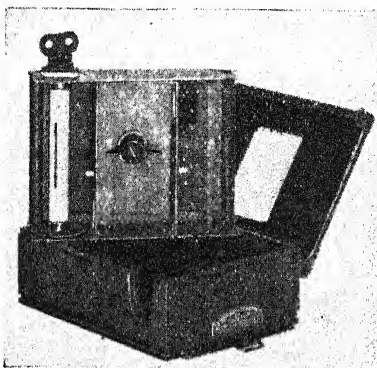
(Sold by Sands, Hunter & Co., Ltd., 37, Bedford Street, Strand, London, W.C. 2.)

This tiny tripod is intended for the use of those amateurs who are interested in obtaining table-top photographs. Although the tripod is so small, measuring less than 7 ins. in length when folded, it is very substantially constructed and is quite capable of supporting a camera of reasonable size and weight. Made in nickel silver it is capable of extending to just over 12 ins. by means of a folding leg. One feature is that, even when placed upon a polished surface there is no chance of the legs slipping, whether fully extended or not. The tripod is sold at 7s. 6d. and can be supplied with a midget ball and socket top at an extra cost of 2s. 6d.

ADAMS ROLL-FILM HOLDER.

(Made by A. Adams & Co., Ltd., 122, Wigmore Street, London, W. 1.)

A piece of equipment which will prove a boon to the photographer who wishes to adapt his plate camera to accommodate roll-films is the roll-film holder which has been put on the market by Messrs.



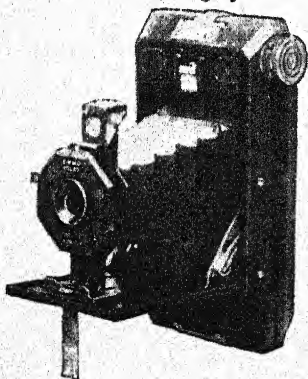
Adams. This box may be adapted to any make of camera, and slides on to the back in the same way as a dark-slide. It takes standard size film which is simply loaded by releasing a spring catch which secures the back. The film is arranged to run between a pressure pad and a sheet of first quality glass, a half-turn of a wing nut, situated at the rear of the box, serving to release the pressure and enable the film to be wound. When wound, the pressure is

again applied, thus ensuring that the sensitive surface will remain absolutely flat during exposure. The box is sold either in quarter plate or $3\frac{1}{2} \times 2\frac{1}{4}$ size, the prices being £8 10s. 0d. and £10 10s. 0d., respectively. Other sizes can be made to order.

SOHO PILOT FOLDING CAMERA.

(Made by Soho, Ltd., 3, Soho Square, London, W. 1.)

A camera for $3\frac{1}{4} \times 2\frac{1}{4}$ in. roll-film that looks exceedingly handsome and is thoroughly effective for holiday snaps is remarkable value for 15s. In the Soho Pilot this is made possible by use of



parts of moulded material, but the camera has reversible brilliant finder, time and instantaneous shutter, and spool holders that are easy to load. Since the single lens with which it is fitted is of focal length, somewhat longer than usually provided on cameras of this size, the camera gives good definition. In short, the Soho Pilot is a triumph of low price film-camera manufacture, and should make innumerable new recruits for photography.

FAMULUS EPIDIASCOPE.

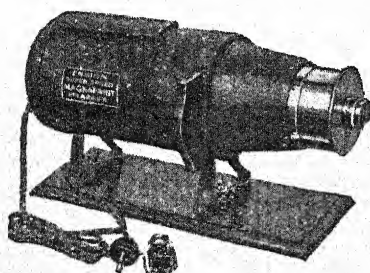
(Made by Zeiss Ikon, Ltd., Mortimer House, 37-41, Mortimer Street, London, W.1.)

This instrument has been entirely re-designed, and although it is somewhat similar in appearance to the model which it supersedes the optical construction has been considerably simplified and improved. As a source of light the instrument now uses a single 500-watt projection lamp with a mirror back instead of the two lamps previously fitted. The cooling fan also is now entirely enclosed in the apparatus, and in consequence it has been possible to make a neat housing which is free from projections, at the same time retaining efficient ventilation. The illumination, both for opaque and diascopic projection is certainly equal, if not even superior, to the model which made use of the two lamps. This illumination has been obtained mainly by employing a number of auxillary mirrors which reflect practically the whole of the available light. The design of the object table is especially good with this instrument, for it permits of the lamp-house being moved up and down the table so that the 6½ in. square episcopic opening may be made to travel over a large book or picture, thus allowing a length of 18 in. to be projected in sections. This new model, of course, still retains, in addition, all the advantages of its predecessor. The price of the epidiасcope complete is £44 15s.

ENSIGN HORIZONTAL MAGNAPRINT ENLARGER.

(Made by Ensign, Ltd., 88-89, High Holborn, London, W.C.1.)

This new enlarger is of the horizontal type, is made throughout of metal, and is extremely well finished outside in black ripple enamel. The cylindrical lamp-house, access to which is obtained



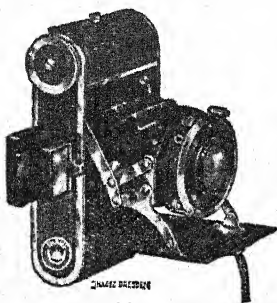
by removing the rear cover, is lined internally with a white heat-resisting surface. The lamp-holder, which is designed to hold a 100 or 150-watt lamp, is fitted to the rear removable cover, a key-way switch, long flex lead, and pin-bayonet plug being provided so that the enlarger may instantly be plugged into an ordinary domestic lamp-holder. The enlarger makes use of diffused

light in conjunction with a condenser, and an excellent and rapid light is thus assured which avoids reproduction of film graininess and scratches upon the enlargement. The equipment is fitted with an Aldis Uno f/7.7 enlarging anastigmat mounted on a front tube which moves easily in its mount for the purpose of focussing. Additional fine focussing is obtained with the lens-mount screw if desired. The enlarger which is mounted upon a wooden base with rubber feet may be obtained in two models to take negatives up to 3½ × 2½ in. or quarter plate. The prices are £5 17s. 6d. and £7 10s. 0d. respectively.

IHAGEE AUTOLETTE CAMERA.

(Sold by Garner & Jones, Ltd., Polebrook House, Golden Square, London, W. 1.)

The latest Ihagee novelty is the Autolette, a beautifully made and dainty little camera taking pictures of V.P. size 4×6.5 cm. The whole camera is constructed of metal, and it possesses a hinged



back for film loading which is operated by a small catch on the top of the camera body. The opening of the camera is entirely automatic, a single pressure of a button at the side causing the lens and shutter unit to spring into position, and also the view-finder to open ready for use. This self-erecting mechanism is very ingeniously constructed, and the design ensures extreme rigidity when the camera is in the open position. The instrument is provided with a helical focussing adjustment which allows objects at 3 ft. to be brought into

focus. The camera may be obtained with various shutters and lenses, and at various prices. For example, the model fitted with the Ihagee anastigmat $f/6.3$ lens and Vario shutter with delayed action release, costs £3 7s. 6d., the $f/4.5$ lens in Pronto shutter £4 15s., and the Zeiss Tessar $f/3.5$ in Compur shutter £11 15s.

COMMERCIAL PHOTOGRAPHIC PRINTING.

(Produced by B. Matthews, 134-140, Idle Road, Bradford.)

The very excellent quality of the real photographic postcard printing carried out by this old established firm is well known, though their work is by no means confined to this branch of commercial photographic printing. Showcards, advertising folders, blotters, folding calendars, etc., are all specialised in, and all of this work is carried out in such a clean and well-finished manner that the results become a real tribute to the goods they are designed to advertise. Messrs. Matthews turn out millions of postcards in the course of a year, and the series recently produced by them for issue by the National Portrait Gallery of London representing the complete collection of paintings in the gallery received well-merited praise in high quarters.

HALF-TONE BLOCKS.

(Made by Garratt & Atkinson, Warwick Works, Ealing, London, W. 5.)

Noted for many years past for the excellence of their photo-etched half-tone blocks, Messrs. Garratt & Atkinson have recently adopted a method of electrolytic etching, finding that this process gives blocks of the desired greater depth (ink-holding capacity) whilst retaining the tone values of the originals. Specimen sheets showing the quality obtainable in printing the blocks made by this process may be had on application.

MICROSCOPE ATTACHMENT FOR ROSS EPIDIASCOPE

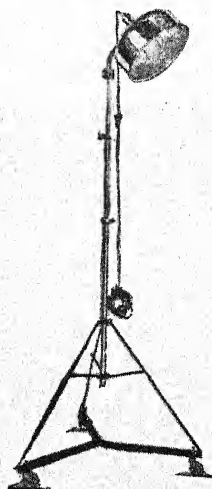
(Made by Ross, Ltd., 3, North Side, Clapham Common, London, S.W. 4.)

The epidiascope is rapidly becoming an indispensable piece of equipment in every school, and its educational value is enhanced proportionately according to the many uses for which it may be employed. The microscope attachment which has recently been introduced by Messrs. Ross for use with their standard epidiascope greatly increases the scope of the instrument, and should certainly be acquired by those already in possession of the apparatus, and included amongst the essential accessories by those who are contemplating the installation of an initial outfit. The attachment has been arranged to be easily interchangeable with the diascope lens, and it can be used with high or low power objectives, according to the distance of the screen. Focussing of the object is effected by a helical focusing mount giving a very smooth and even movement. The microscope objectives usually supplied are of $2\frac{1}{2}$ in. and $1\frac{1}{4}$ in. focus, but any objective from $\frac{1}{8}$ in. can be adapted by means of a flange, including those which are the property of the customer. The price of the microscope attachment is £7 10s. 0d. complete with one objective.

ENSIGN MULTILITE UNIT LIGHTING EQUIPMENT.

(Made by Ensign, Ltd., 88-89, High Holborn, London, W.C. 1.)

This lighting equipment is designed for all purposes and in such a manner that the user is enabled to start with a single light and



gradually to build up a complete lighting equipment to meet his increasing requirements. The single Multilite unit consists of a solidly built reflector mounted on a flexible tube, which allows it to be adjusted to any position or angle required. The reflector is fitted normally with a 500-watt Nitraphot lamp, though a 100-watt lamp may be substituted if desired. A stand which, when folded, is extremely portable, comprises one of the units. This is capable of extension up to 8 ft., and may be used to accommodate either one, two, or three lamps as required. A cast pedestal may also be supplied, so that the lamp may be used on the floor, if necessary. The interchangeability of each unit enables any lighting effect to be secured in a moment and with a minimum of effort. The prices range from £1 17s. 6d. for the Floor Multilite to £2 15s. 0d. for the Single Standard, £4 10s. 0d. for the Double Standard, and £5 15s. 0d. for the Triple Standard patterns. The Nitraphot lamps are priced at

£1 3s. 6d. each, or the Osram 100-watt at 3s. 3d.

ILFORD NEGATIVE CARDS.

(Made by Ilford, Ltd., Ilford, London.)

A new type of Ilford sensitive material is the Negative Card made in two degrees of speed, one for use in studios employing daylight or artificial light and the other, with much slower emulsion, for outdoor exposures as employed by beach photographers and others. Owing to the way in which the image is produced, namely as reflection densities on a white almost opaque support, the speed of the emulsion may be taken for practical purposes as about 1,000 H. & D. in the case of the Studio Negative Card, and at about 250 H. & D. for the Outdoor Negative Card. In both cases the emulsion, as required in the cheap photographic work for which this material is chiefly intended, develops up quickly to excellent gradation, and the finished negatives are readily retouched with pencil or knife or with water colour applied with a brush, although probably a large proportion of negatives made in this way are not retouched at all. Both grades of the Negative Cards are supplied at the same prices as the Ilford double-weight bromide paper.

ENSIGN FLASH-BULB OUTFIT.

(Made by Ensign, Ltd., 88-89, High Holborn, London, W.C. 1.)

This apparatus makes it possible for the amateur to obtain snapshots indoors without the inconvenience of the smoke and noise which ordinarily accompanies the letting off of flash powder. It consists of an electric bulb which is fitted into a hand-held reflector, and which, upon making connection with an ordinary torch battery, gives a silent flash sufficiently brilliant to obtain portraits up to a distance of ten feet. The outfit costs 12s. 6d. and contains a Multiray reflector, two flash bulbs, a test bulb, and a torch and battery. Extra bulbs may be obtained for 1s. 3d. each.

ZEISS $f/2.8$ TESSAR LENSES.

(Made by Carl Zeiss, (London), Ltd., 37-41, Mortimer Street, London, W. 1.)

In producing this $f/2.8$ Tessar the Zeiss works have succeeded in meeting the desire of the small-film camera user for increased rapidity. The lens covers an angle of more than 50 degs. at full aperture with that excellent definition and brilliancy which is characteristic of all the Zeiss Tessars, and despite the very large aperture, it covers a diagonal equal to the focal length. It is at present available in focal lengths of 5 cm. for pictures 36×24 mm. and 4×3 cm., and 6 cm. for pictures 4×4 cm.

Fortunately it has been possible to design the lens so that the smallest size Compur shutter may be fitted to both focal lengths and this without detriment to the relative aperture of $f/2.8$. The rapidity of the new lens, at full aperture is fully 50 per cent. greater than the $f/3.5$ lens and 150 per cent. greater than the $f/4.5$, and there are many opportunities of making use of this wide aperture with a small film camera, for the depth of focus is amply sufficient for many of the subjects which occur in practice. The price of the lens, when fitted in the Compur shutter is £10 4s. 0d. in either of the focal lengths, or £8 14s. 0d. for the 5 cm. lens in standard mount.

NEW DALLMEYER LENSES.

(Made by J. H. Dallmeyer, Ltd., 31, Mortimer Street, London, W. 1.)

A number of new lenses, including large-aperture anastigmats, enlarging anastigmats, and lenses of the telephoto type, have been added to the already large Dallmeyer range. Amongst these should be mentioned the Triple Anastigmat series which consist of short-focus lenses of 1, 2, 3 and 4 ins. focal length suitable for use in 16-mm. cine cameras and working at an aperture of $f/2.9$. The prices of these range from £6 in micrometer mounts. A new addition also to the well-known series of Popular telephoto lens suitable for use in the Kodak and Ensign 16 mm. cameras has been made. This has a focal length of 3 ins. and sells at £5 5s.

The series of $f/4$ enlarging anastigmat lenses has been added to by the inclusion of shorter focal lengths, *i.e.*, a 3, 4 and 5 ins., for use with half-watt light. Messrs. Dallmeyer are now able, also, to supply the Serrac $f/4.5$ lens for enlarging purposes specially corrected for mercury-vapour light, the cost of the alteration being £1 1s. over and above the ordinary catalogue prices.

AGFA LEICA FILMS.

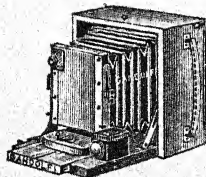
(Sold by E. Leitz (London), 20, Mortimer Street, London, W. 1.)

The loading of the Leica has been made still easier by the introduction of Agfa Leica films, obtainable in cardboard containers which serve as spool chambers, and which are inserted together with the film into the camera. Thus loading is made just as easy as with the simplest type of camera, and those who may have considered the loading of the Leica too "scientific" in the past will certainly have no more reason to do so. The film is obtainable in three qualities, *viz.*: Anti-halo fine grain, 600 H. & D., price 3s. 4d.; Isochrom film, 1,300 H. & D., at 3s. 8d., and super-panchromatic, price 4s. 0d.

SIMPLEX STAND CAMERAS.

(Made by Louis Gandolfi & Sons, 2, Borland Road, Stuart Road, Peckham Rye, London, S.E. 15.)

The Simplex camera is a stand camera suitable for all-round purposes and is of that excellent workmanship which characterises all apparatus turned out by the firm of Gandolfi & Sons. It is made in quarter-plate size and may be provided with book-form slides or, alternatively, an adapter back may be used for metal slides or film-pack, or a roll-film holder may be fitted if desired. The camera is capable of extending to upwards of 12 ins., a reversing back and ample rise of front is provided, and in every way the apparatus is strongly made and excellently finished. The price of the quarter-plate camera is £4 15s., with an extra charge of 17s. each for bookform slides. A Simplex de luxe model may also be supplied with additional movements at a cost of £7.



RIDGFLEX PHOTOGRAPHIC ALBUMS.

(Made by Samuel Jones & Co., Ltd., Bridewell Place, London, E.C. 4.)

These are most attractive photographic albums in various patterns and sizes which should have a ready sale to amateur photographers. The albums are well made and most tastefully finished with stout leaves of excellent quality. Messrs. Jones also supply boxes of paper dots which are gummed on each side and will be found extremely useful by the amateur for mounting snaps in the albums in such a way that cockling of the leaves will be avoided in the process. A full illustrated price list of the range of many albums and other specialities is issued by Messrs. Jones.

RITEWAY ROLL-FILM HOLDER.

(Made by British Camera Manufacturing Co., Ltd., 113, Queen's Road, Bayswater, London, W. 2.)

This holder for roll-film spools, for use with a plate camera, has the advantage of taking the film "the right way round," and of holding the 8-exposure spool. Also, it is fitted with a most excellent pressure back for holding the film perfectly flat. The whole appliance is very well made. At present it is obtainable only in $3\frac{1}{2} \times 2\frac{1}{2}$ in. size, price 35s.

DIXON PAPER-SHREDDING MACHINE.

(Made by T. H. Dixon & Co., Ltd., Works Road, Letchworth, Herts.)

Whilst continually producing improvements in their several machines for the coating, drying and cutting of photographic plates, films and paper, Messrs. Dixon have brought out a machine of service in many large business establishments, namely one for shredding waste paper into packing material. Paper is fed into a hopper and is discharged as shavings of any width from $\frac{1}{8}$ -in. upwards, produced by rotating circular knives. A small machine, costing from £60 to £75, produces at least 112 lbs. of shredded packing per hour, although occupying a floor space of only 30×36 ins. Two larger machines are made.

NAGEL VOLLEND A CAMERA No. 48.

(Sold by R. F. Hunter, Ltd., 51, Grays Inn Road, London, W.C. 1.)

The Vollenda is a new addition to the popular range of Nagel cameras and takes 16.3×4 cm. pictures on a standard V.P. film. It is a tiny camera which will easily slip into a lady's handbag, and owing to the fact that the body is cast in very light metal, it weighs but $11\frac{1}{2}$ ozs. inclusive of the Compur shutter and $f/3.5$ lens with which it is normally fitted. It is a self-erecting camera, opening and closing in the simplest manner merely with one press of a finger. The handsome shape and faultless workmanship of this little instrument will commend it especially to those who wish for an up-to-date addition to the cameras they may already possess. The prices range from £4 0s. 0d. when fitted with Schneider Radionar $f/4.5$ lens and Nagel shutter, to £13 10s. 0d. with $f/2.8$ Tessar and Compur shutter.

PERUTZ-LEICA FILMS.

(Sold by Westminster Photographic Exchange, Ltd., 119, Victoria St., London, S.W. 1.)

Leica users will appreciate the new lengths of Perutz film now available as daylight-loading spools, giving 10 and 12 exposures with the Leica camera. So many people prefer to use spools of a lesser number of exposures than the standard 36 that the Perutz films giving this facility are assured of considerable favour. The films are obtainable as Persenso High-speed Orthochromatic of 23 deg. Sch., price 1s. 9d. for 10 exposures, or as Perutz Special Fine-grain Orthochromatic of 19 deg. Sch., price 1s. 9d. for 12 exposures. Perutz film is also available for the new Zeiss Ikon Contax camera taking 35 mm. film, namely in the shape of daylight-loading spools of 36 exposures (Special Fine-grain Orthochromatic), price 3s. 8d.

ENSIGN ELECTRIC TORCH POINTER

(Made by Ensign, Ltd., 88-89, High Holborn, London, W.C. 1.)

This ingenious little device will be welcomed by the lanternist, for it definitely fills a long felt want, namely a means of pointing out details on the screen to the audience other than that of the pointer, which has often proved such a nuisance to the lecturer in the past. It comprises an electric torch which is arranged to project an arrow, by means of a focussing lens, upon any desired portion of the screen. The lecturer thus requires no stick, nor need he move from his reading position at the desk during the whole course of his lecture. The price of the accessory is 15s., inclusive of battery.

SICKLE GLAZING PRESS.

(Made by O. Sichel & Co., 52, Bunhill Row, London, E.C. 1.)

Since this press was noticed in last year's Almanac, it has been manufactured in England, with improvement of the heating elements. By means of a special electric blanket the entire area of the curved heating plate is evenly warmed. Moreover, as the result of making the Press in one size only, viz. 24 x 18 in., a great reduction has been made in the price, viz., to £7 10s., including wooden base, flex and plug, but not including glazing plates. These latter of 24 x 18 in. size are now supplied in solid chromium steel at £1 10s. each, or as chromium-plated sheets, at 10s. each.

PHOTOGRAPHIC PRINTING, Etc.

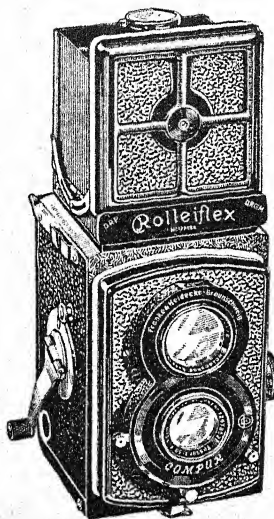
(Marshall & Co., Ford Street, Nottingham Road, Nottingham.)

A selection of the most recent examples of their work shows the very high quality and exceedingly wide range of the photographic printing done by Messrs. Marshall. Among the specialties are included view postcards in various surfaces, commercial real-photo postcards, both monochrome and hand coloured, small folders and calendars and trade cards and photographic blotters, the latter a real photograph backed up with blotting paper and thus affording a valuable advertisement as long as the blotter remains in use.

THE NEW $2\frac{1}{2} \times 2\frac{1}{2}$ ROLLEIFLEX ROLL-FILM REFLEX CAMERA.

(Sold by R. F. Hunter, Ltd., 51, Gray's Inn Road, London, W.C.1.)

The Rolleiflex twin-lens reflex camera has earned its position amongst the foremost small cameras of this type, and the important improvements incorporated



certainly make it even more popular. No pointer or metal ring is now used on the shutter, which has been considerably simplified by fitting a common lever for tension and release. All the levers are easily controlled at once owing to their convenient placing around the shutter. An indicator for both stop and speed adjustments is placed in a window immediately in front of the focussing hood and above the shutter, and consequently, up to the moment of exposure, the stop, focus, and speed of exposure may be altered without setting the camera down or removing the eye from the screen. The film is changed by a cranking motion of the handle, the spacing of the film between each exposure being automatically adjusted. The old pattern Rolleiflex of the same size took a $2\frac{1}{2} \times 2\frac{1}{2}$ in. film, but the new automatic model takes a standard 8 exposure, $3\frac{1}{2} \times 2\frac{1}{2}$ in. film and gives 12 $2\frac{1}{2} \times 2\frac{1}{2}$ in. exposures upon

it. The new model is fitted with either Tessar $f/4.5$ lens at £20, or $f/3.8$ Tessar at £22 10s. 0d.

SPEERA BINOCULAR SPECTACLE MAGNIFIERS.

(Made by W. Watson & Sons, Ltd., 313, High Holborn, London, W.C.1.)

These magnifiers, made in the form of a pair of spectacles, are most convenient for the examination of negatives, cine films, photo-etched plates, etc., since they leave both hands free, yet allow of a degree of magnification of either $3\frac{1}{2}$, $2\frac{1}{2}$ or $1\frac{1}{2}$ diameters, according to the power of lens selected. The glasses give achromatic definition, and should be of exceptional usefulness in focussing the image on the ground glass screen in the case of subjects such as interiors where the image is so dim as to be almost useless for focussing when observed only with the unaided eyes. The frame of the magnifiers is made of open pattern, so as to allow of ordinary sight alternatively with the observation through the glasses. The price, in one or other of the powers mentioned above, is £2 complete in case.

DALLMEYER ORTHOCHROMATIC FILTERS.

(Made by J. H. Dallmeyer, Ltd., 31, Mortimer Street, London, W. 1.)

Dallmeyer colour filters are made from the best quality British optical glass, the colouring matter, which is embodied in the glass itself, being perfectly evenly distributed. The surfaces of the filters are optically polished, and there is no chance of the definition becoming impaired, even when using them with lenses of large aperture. The design of the cells which hold the filters is such that there is no strain, which is often a cause of loss of definition with mounts less carefully designed. The colour of the glass is not subject to deterioration when exposed either to heat or sunlight. The filters are made in three densities, $\times 2$, $\times 3$, and $\times 4$, the colour being arranged to cut off the highly actinic ultra-violet end of the spectrum, reduce the violet and give a maximum in the green. The prices range from 10s. for the $\frac{3}{4}$ -in. diameter to 50s. for the $3\frac{1}{4}$ -in. diameter.

**MERRETT MARGIN TRIMMER.**

(Made by The Adhesive Dry Mounting Co., 27 and 28, Fetter Lane, London, E.C. 4.)

This trimmer is constructed to serve a double purpose, for not only may it be used as an ordinary print trimmer, but it may also be converted into a margin trimmer capable of trimming margins from $\frac{1}{16}$ -in. to $\frac{3}{8}$ -in. In order to use the trimmer for ordinary purposes an arrow is set to a mark on the brass rule. When margins are required, all that is necessary is to turn a milled screw (located under the base of the desk) until the arrow on the steel bar marks the required margin. The print is then placed under the top bar at the line edge of the picture and the desk is pressed down in the ordinary way, when a perfectly even margin is obtained. The price of the trimmer with an $8\frac{1}{2}$ in. cut is £1 5s.

THE APTUS AUTOCARD CAMERA.

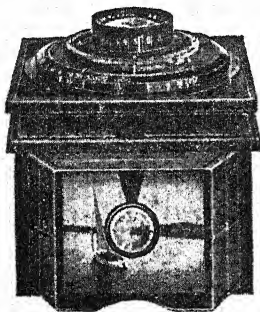
(Made by Moore & Co., 101 & 103, Dale Street, Liverpool.)

This ferrotype card camera is of new design and is very strongly constructed from metal castings which will stand any amount of hard wear. The camera holds a pack of $50\ 3\frac{1}{4} \times 2\frac{1}{2}$ in. cards, which may be loaded in a few seconds in daylight, the cards then remaining in position for exposure. The camera is provided with an $f/4.5$ Aldis anastigmat lens in focussing mount of 4-in. focal length. A side-operated shutter and direct-vision brilliant viewfinder are also provided as well as a stout wooden tripod which folds reasonably small for carrying. A reversing back allows of horizontal pictures being obtained when required. A vulcanite developing tank with two chambers is fixed to the underside of the camera by means of a single screw so that it may be easily detached for filling; the exposed cards drop into it automatically for completion of the combined developing and fixing operation. Altogether a very serviceable apparatus, requiring practically no knowledge of photography to operate. The price is £10 10s. 0d.

MENTOR COMPUR REFLEX.

(Made by Mentor Camera Works, Dresden 50.)

As these pages are being closed for the press, particulars are to hand of an entirely new camera by the well-known Mentor Co., viz., a reflex fitted with Compur shutter, reversing back, and designed



so that the scales for adjusting lens aperture, shutter speed, and distance of subject may all be viewed from above. Moreover, the hood is fitted with a magnifier. With $f/4.5$ Zeiss Tessar the price, including three metal slides, is R.M. 264; with $f/3.5$ Tessar, R.M. 303. The camera is also made without reversing back at the respective prices of R.M. 198 and R.M. 231.

We are also able to include in this last-minute notice a mention of the improved model of the Mentor Three-Four roll-film camera, taking 16 pictures of 3×4 cm. size. This has

now been greatly improved by special provision for flatness of the film and by extremely rigid tubular focussing movement. With $f/4.5$ Zeiss Tessar the price is R.M. 123.

WELLCOME PHOTOGRAPHIC DIARY, 1933.

(Burroughs Wellcome & Co., Snow Hill Buildings, London, E.C. 1.)

The 1933 edition of this wonderful little annual has again been brought right up to date by the inclusion in it of information regarding plate films and paper which have appeared on the market since the last issue was published. The book is designed to assist the photographer at every stage of his work, and so well does it carry out this aim that the diversity of information contained in it is almost encyclopædic, and it has become almost an indispensable companion to every amateur photographer. Apart from all this mass of really useful information the inclusion in the diary of the exposure calculator has always been a feature of the book and has probably a great deal to do with its great and growing popularity.

ANY-ANGLE TRIPOD.

(Sold by Sands, Hunter & Co., Ltd., 37, Bedford Street, Strand, London, W.C. 2.)

This tripod is of the extending tubular type, but is constructed of a metal section which is triangular on its inner face, thus permitting the utmost compactness to be obtained. About 17 ins. in length when folded, the tripod extends to about 4 ft., in which position it retains extreme rigidity. It is constructed of light aluminium alloy, which assures both lightness and maximum strength. As its name implies, the tripod is furnished with a ball and socket joint which allows the camera to be placed in any desired position with the greatest ease. The price is 12s. 6d., or, including solid leather case, 20s.

HOLDER FOR DRY-MOUNTING FIXING IRONS.

(Made by The Adhesive Dry Mounting Co., 27 and 28, Fetter Lane, London, E.C. 4.)

The use of a single fixing iron when a large quantity of dry mounting has to be done is always a serious cause of delay, and as a method of overcoming this the new triple gas burner and holder for fixing irons will be welcomed by all those who deal with large numbers of prints. The burner and stand accommodate three irons at the same time, and although the consumption of gas is exceedingly small, a regulator tap is also provided to adjust the flame if necessary.

EXCELSIOR DWARF TRIPOD.

(Sold by Actina, Ltd., 29, Red Lion Square, High Holborn, London, W.C. 1.)

This convenient little tripod is exceedingly strong when in the extended position although it closes flat to the very small dimensions of $8 \times 2\frac{1}{2} \times \frac{3}{4}$ ins. It is constructed of ten sections which when drawn out give a tripod height of 45 ins. The tripod is very well constructed and finished with nickel-plated fittings and may be carried in the pocket quite easily. The price is 30s.

EMULSION GELATINES.

(Made by British Gelatine Works, Ltd., 17, Wilson Street, Finsbury, London, E.C. 2.)

Reference may fittingly be made in these pages to the photographic gelatines made for the manufacture of all descriptions of sensitive material for photography by the British Gelatine Works, Ltd., which firm, as C. Simcons & Co., has been engaged in this branch of manufacture for more than 30 years. Their works at Luton cover about 10 acres, and include the most up-to-date machinery for production of gelatines of the extreme purity required for photographic manufacture.

ONE-LINE MAGNIFYING READER.

(Sold by James A. Sinclair & Co., Ltd., 3, Whitehall, London, S.W. 1.)

This very useful little appliance is a magnifying lens in the shape of a glass bar of semi-circular section and about 4 in. in length, suitably mounted in metal ends, one of which is fitted with a ring for hanging. Laid on a page of printed matter, the lens gives a magnification in the vertical direction, amply sufficient to render



type, e.g., that in a telephone directory, easily legible by those of poor sight. The "lens" also concentrates the light on the type which is being read, so that the looking up of any entry in a closely printed list is immensely facilitated. The price of this most useful instrument is 3s. 6d., complete in leather case.

METEOR HALF-WATT LAMP.

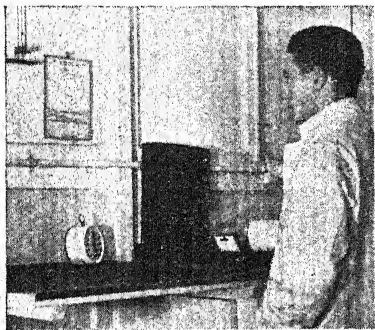
(Sold by O. Sichel & Co., 52, Bunhill Row, London, E.C. 1.)

A new model of these well-known lamps is now available with an aluminium reflector of ample size, affording a wide even beam of light. This is obtained by a matt surface, guaranteed to retain its reflecting power. Means are provided for tilting the lamp to any angle and also for fitting it to a collapsible stand of heavy build. This latter is of black-enamel non-rusting finish. The reflector is supplied with the standard E.S. screw to take the 500-watt Nitrachot bulb. These new reflectors are priced at £1 1s. complete with flex and plug.

DEVELOPMENT CALCULATOR FOR PROFESSIONAL FILM.

(Made by Kodak, Ltd., Kingsway, London, W.C. 2.)

Designed for the purpose of assisting the professional photographer in the development of his film negatives, this calculator should very quickly establish itself as an indispensable accessory in every dark-



room where such work is undertaken. Owing to the constantly varying factors which are inevitably connected with a developing solution, which is sometimes kept for weeks, the time and temperature system of development is in many ways unsuitable for tank-developed professional exposures. The factors involved, however, are such that a careful analysis of them has made it possible to construct a calculator which will yield consistent

results, even with a developer which has been kept for a month. This calculator (which is the copyright of Kodak, Ltd.) is of simple slide-rule type, containing but one movable circular scale. In order to use it, the developer and strengthener are made up in the usual way, and the date noted upon a tablet provided for the purpose. The temperature of the developer is then taken, and this is adjusted, approximately to normal, if it is below 60 degrees or over 70 degrees. The movable pointer is next set to a scale which indicates the age of the developer, and the exact time of development is then read off against the temperature figure. Directions for strengthening the developer are contained on the back of the calculator, and each morning the "age of developer" scale is put forward one division. Negative material, which may, of course, vary considerably in gamma, is divided into two classes, each of which is catered for on the scales of the calculator. Apart from the simplification of

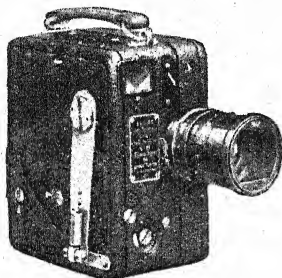
dark-room manipulation afforded by the use of the calculator, the advantage of turning out consistent negatives will be felt in the printing-room and a cutting down of wastage will be inevitable.

CINE REQUISITES.

THE KINAMO K.S. 10. CINE CAMERA

(Made by Zeiss Ikon, Ltd., 37-41, Mortimer Street, London, W. 1.)

This new camera of Zeiss Ikon is designed to take 16 mm. film and is one of the smallest instruments, taking this size of film, on the British market, weighing, as it does, only 3 lbs. The new



camera is fitted with a Zeiss Sonnar, a lens of new construction having an aperture of $f/1.4$ and of 2.5 cm. focal length. The lens is readily removable, and there are interchangeable Sonnar lenses of 3 ins. (at $f/4$) and 2 ins. (at $f/2.8$). The view finder is enclosed in the camera, interchangeable front lenses being available for camera lenses of different focal lengths. Another innovation is the delayed-action device. Before setting the delayed action a piece of paper is clamped under a small lever

on the front of the camera. When the camera is released and the photographer is in the view of the lens he will see the piece of paper flutter to the ground just before the camera mechanism starts up. The film is loaded into the cameras in cassettes holding 33 ft. of film, in which separate spindles are provided for feed and pick-up. Separate feed and take-up sprockets are also fitted. On this new model the claw remains in the film when at rest, and it is necessary to turn a small lever before loading and unloading. Unless this lever is moved, however, the film cannot be moved in or out of the gate and there is no chance of mistakes. An unusual and very useful feature which is retained in this camera is the second footage meter which registers the amount of footage which remains to pass before the spring ceases in its run of thirteen feet. The camera is leather-covered and is an extremely compact and portable instrument of the high standard one has come to expect from Zeiss Ikon. With $f/1.4$ Sonnar lens the price is £40.

WESTON UNIVERSAL EXPOSURE METER.

(Made by Weston Electrical Instrument Corporation, 614, Frelinghuysen Avenue, Newark, U.S.A.)

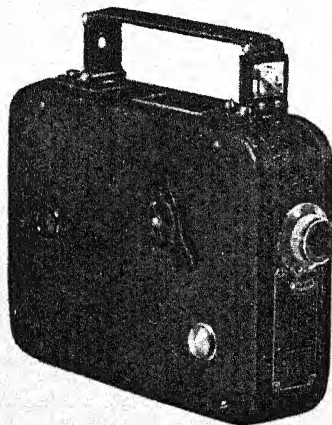
This universal meter is of the type employing a photo-electric cell to record the light from the subject to be photographed. It is, however, unusual in that it requires no batteries to operate it. One has merely to look along the sight, thus pointing the two eyes of the instrument in the required direction, and the pointer of the meter immediately registers the amount of light. The meter is

calibrated in "candles per square foot," and from this reading the exposure can easily be read off from a rotating dial in which provision is made for the speed of film and the contrasts of the subject. In this latter respect, readings may be taken independently of the darkest and the brightest parts of a subject when this is required for a particular class of work. The meter is intended both for still and cine work, a pointer indicating the aperture required for the usual cine exposure of $1/32$ nd sec. A very useful provision is that made for dull light. When the meter registers below a certain figure, the pressure of a button causes the meter to register ten times the reading it gave formerly. Using no batteries and with photo-cells that are given an unlimited life, this meter has an enormous scope, giving, as it does, an accurate figure without delay.

THE CINE-KODAK EIGHT.

(Made by Kodak, Ltd., Kingsway, London, W.C. 2.)

This camera makes use of an entirely novel method of film exposure, which has the effect of considerably reducing the costs of sub-standard ciné work. The width of the new film is eight milli-



metres, but it does not attain this width until it is ready for projection. Film of the standard width of 16 mm. is loaded into the camera and is exposed down one side only. It is then removed from the pick-up spindle and placed again on the feed spindle.

On exposure the second time, the pictures are recorded upon the other half of the film. After processing, the film is split down the middle and joined to produce one continuous reel of 8 mm. film. On the 16 mm. film four pictures are accommodated on the area normally taken by one, each frame on the new film being about 5 mm. wide by $3\frac{1}{2}$ mm. high.

A special backed film of extremely fine grain has been produced for use in the camera, and is sold in spools of 25 ft., which, when processed, has a running time equal to 100 ft. of standard 16 mm. film. The clockwork-driven camera is very small and compact, measuring less than $4\frac{1}{2}$ ins. high and less than $1\frac{1}{2}$ ins. in width, yet despite these small proportions it is capable of making pictures of very high quality. It is fitted with a Kodak $f/3.5$ anastigmat lens, and an unusual feature is the fixing of the carrying handle to the tops of the sighter and lens of the view finder.

The Kodoscope Eight Model 30 has been specially designed to project the film made with the Ciné-Kodak Eight. In spite of the

small size of the film a brightly-lit, steady, and grainless picture, 22×30 in., may be projected with it. The illuminant consists of a special 100-watt lamp which, similarly to the driving motor, may be run from the ordinary domestic supply. Lamp and resistance are both fan-cooled, and an automatic mica screen comes into operation when the speed of the projector becomes sufficiently slow to be dangerous to the film.

LENSES FOR BELL & HOWELL CINE CAMERAS.

(Made by Taylor, Taylor & Hobson, Ltd., 314, Regent Street, London, W. 1.)

Made especially for the Bell & Howell Filmo 70 camera by Taylor, Taylor & Hobson, Ltd., is a new lens of very large aperture. This lens is of 1-in. focal length and at $f/1.3$ covers the 16 mm. size picture in a most satisfactory manner. For theatre work, home movies, surgical operations, factory processes, etc., this lens should be hard to beat. The price is £10 10s. 0d.

Another recent production is a wide-angle projection lens for the Filmo projector. Of 0.64-in. focal length it works at $f/4$ and should prove of great assistance to those who require to project in places where the length of throw is severely limited and where the greatest possible picture size and brilliancy is demanded. It gives a bright picture 14×11 ins. in size at only 2 ft. distance. The price is £5 5s.

THE ELECTROPHOT EXPOSURE METER.

(Made by the Bell & Howell Co., Ltd., 320, Regent Street, London, W. 1.)

This is an exposure meter, of a revolutionary type. It is of the size of a 100-ft. carton of 16 mm. film, so may be readily slipped into a pocket in the camera case. The meter contains a photo-



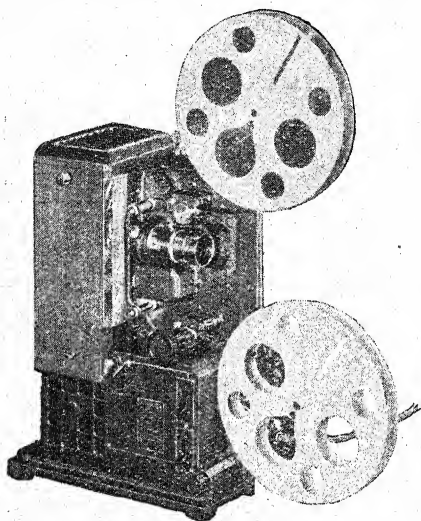
electric cell, which first measures the light from the subject and then, on a dial, shows the correct f number of the stop required for a cine camera giving an exposure of one thirty-second of a second. In use, a cap on the front is removed to expose the photo-electric cell. The instrument is then held flat and pointed at the object to be taken, a small reflex view-finder being provided for this purpose. A red button is pressed which puts the apparatus into operation, and the stop

number is read off from the dial facing the operator. The photo cell is of selenium, and the battery (3 volts only), is readily replaceable. As, however, the current consumption is .0001 amp. only, the life of the battery is very nearly its storage life. Although designed primarily for cinematograph use there is no reason why it should not be used also by still photographers. The price is £11.

THE KODAK K CINE PROJECTOR.

(Made by Kodak, Ltd., Kingsway, London, W.C.2.)

This is a de luxe instrument of reasonably small size and weight, which puts up a remarkably fine performance on the screen. The supply and pick-up reels and the separate feed and take-up sprockets



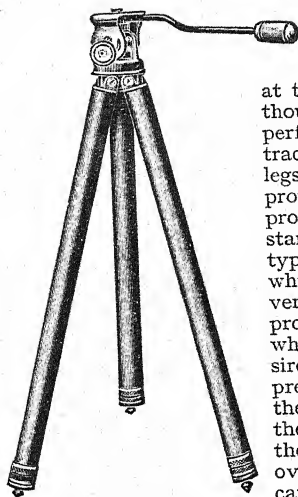
are to the front of the machine, while direct lighting is adopted. The illumination is by means of a 260-watt lamp, the filaments of which are set out of centre, nearer the condenser, in order to take advantage of the wider angle of direct rays from the lamp thus obtainable. There is also an efficient reflector, which is adjustable. The shutter is of the three-blade type, and incorporates a heat resistance for stills in place of the dropping gauze cut-off usually employed in sub-standard projectors. The double-claw intermittent mechanism resembles

in action that of the well-known "grass hopper," with one idler stroke, although both the up-and-down and the push-forward movements are actuated by cams, giving a very rapid film change. The film may be run both forward and reverse. The lamp-house and all the mechanism are readily available for cleaning, while the oiling is by means of wick feeds, in pipes, to the various bearings. The re-wind is simple, and the controls are all readily available at the right and back of the machine. A small illuminated ammeter for the lamp is provided, and a lead is taken to a small table-lamp, controlled from the machine, which automatically dims when the projector is started. The machine is of good appearance, finished in bronze, and complete in carrying case, sells at £79 10s. If required on circuits of 200 to 250 volts, an additional resistance is required which, complete in carrying case, costs £5 10s.

THE PANO-TILT CINE TRIPOD.

(Sold by Sands, Hunter & Co., Ltd., 37, Bedford Street, Strand, London, W.C.2.)

The Pano-tilt tripod which has been placed on the market by Sands, Hunter & Co., is a piece of equipment designed especially for the use of ciné workers. The legs of the stand consist of two-

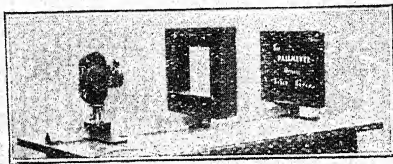


draw metal tubes of very stout construction of which the lower tube may be fixed in any position by simply turning the locking-ring at the bottom of the upper tube. Although the legs are tubular, they are perfectly rigid and without the slightest trace of give or lash. The feet of the legs are pointed, and rubber shoes are provided for use, if desired, in order to protect the flooring. The head of the stand is fitted with the familiar light type of panning and tilting head, which may be conveniently locked either vertically or horizontally. A scale is provided for the horizontal movement, which is a convenience when it is desired to bring the camera round to a predetermined point without recourse to the view-finder. Springs are fitted to the tilting movement which act to bring the platform back to the level, thus overcoming the tendency which a tilted camera has to topple over. The platform has an extension handle fitted with a solid grip, and both the pan and tilt movements are quiet in operation. It has the great merit of lightness and ease of portability, and is sold complete in a leather carrying case, price £6 6s.

DALLMEYER OPTICAL-BENCH TITLING OUTFIT.

(Made by J. H. Dallmeyer, Ltd., 31, Mortimer Street, London, W. 1.)

This cine-tilting outfit which has recently been introduced by Messrs. Dallmeyer is new in design and embodies the principle of the triangular optical-bench for mounting camera and title upon, thus ensuring accurate centring and alignment between the two. The illuminant consists of a trough which accommodates eight 60-watt incandescent lamps which provide an ample light and enable an aperture of $f/5.6$ to be used when

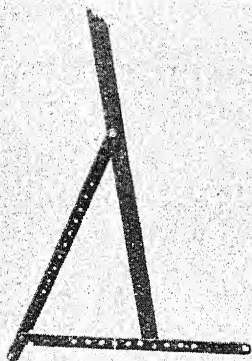


working at 16 pictures per second. A font of over 400 specially prepared white felt letters and figures are supplied with each outfit, together with a black felt board with which an endless variety of titles may be made. The price of the outfit is £8 8s.

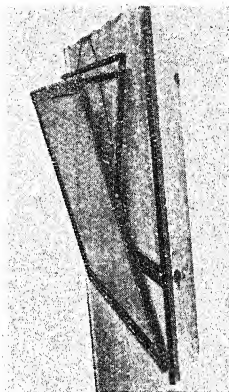
PARAPLANE ALL-METAL PROJECTION PANEL.

(Made by Westminster Photographic Exchange, Ltd., 119, Victoria St., London, S.W.1.)

This "panel" for showing cine films is so named because it is a perfectly flat screen (of metal), free from liability to sag or crack. It thus affords the most uniform projection of the picture, which is shown in full brilliance owing to the highly reflective satin-silver coating which it bears. Optically the screen is of the highest excellence, and its mechanical features also render it most convenient. It is mounted in a stout wooden frame provided, on the back with chains and rods for either hanging or standing the screen in position for use. For hanging, the chain is very simply taken up so as to



Standing.



Hanging.

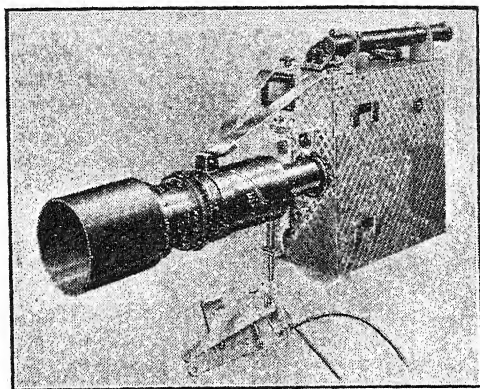
suspend the screen at any convenient height without knocking nails into a wall for the purpose. Moreover, it can be arranged to hang on a wall tilted either downwards or upwards so as to come into position at right-angles to the axis of the projection lens. These same facilities are obtained when standing the screen on a table or other support. Here again it can be tilted in either direction. The rods which serve this double purpose also fulfil the third function of a carrying handle. Complete in stout card case the panel sells at £1 18s. 6d. in the "home model" size (32 × 24 in.), and at £2 18s. 6d. in the "salon model" (40 × 30 in.).

N.S. AUTO KINE CAMERA.

(Made by James A. Sinclair & Co., Ltd., 3, Whitehall, London, S.W. 1.)

In past issues of this Almanac we have referred to the extreme perfection, in design and construction, of this camera for 35 mm. cinematograph film with its unique feature of clockwork drive of 200 ft. of film at one winding, and at a constant speed. There are many other unique features of the apparatus which have made it

the choice of official institutions and of expeditions including that to Mount Everest. A new attachment which is of further value, particularly to the explorer, since it allows of exposing film at practically any distance of the operator from the subject, is the Court-Treatt starting and stopping device, which is readily attached to the camera without any interference with its other functions.



The attachment consists of two parts, one of which is fitted to the camera, whilst the other (connected thereto with a Bowden cable) is secured to some firm support such as a tree. To this latter part is attached a cord which may be of any length, and when this cord is pulled tight the camera ceases exposing, release of the tension on the cord then starting the exposing mechanism of the camera. The attachment is of such robust and simple construction that it may be relied upon for constant use under any conditions. The price of the device is £8 10s. The price of the complete camera with film-box and 2-in. $f/3.5$ Ross Xpres lens, is £120. Incidentally, the illustration shows the genius of Mr. Newman in designing an attachment for a Ross 17-in. telephoto lens of $f/6.3$ aperture, with which some most remarkable cinematograph films have been taken. The price of this lens, plus the necessary fittings, is £30.

SUPER-SPEED KODACOLOR FILM.

(Made by Kodak, Ltd., Kingsway, London, W.C. 2.)

The Kodak company has recently put on the market a new super-sensitive Kodacolor film which is twice as fast as its forerunner. With this film, colour pictures may be made in bright summer daylight, even if the sun is obscured, while, if the weather is dull, or the subject is in open shade, pictures may be taken by running the camera at half speed. In sunlight a neutral density filter is required,

to cut down the exposure, for it is necessary that the lens remains at the aperture of $f/1.9$ in order to get correct colour rendering.

The Kodak Company claims that the new film gives richer and more vivid renderings of natural colours, and this is amply borne out by a number of examples seen. The price of the new film is the same as the old, viz., 40s. for 100 ft., or 21s. for a 50 ft. spool, inclusive of processing.

DALLMEYER SUPER-SIX ANASTIGMAT LENSES.

(Made by J. H. Dallmeyer, Ltd., 31, Mortimer Street, London, W. 1.)

As their title suggests, these lenses have been named after the number of glasses which are employed in their construction. They are intended for the cine and still worker who requires a well-



corrected anastigmat lens capable of giving critical definition over an angle of about 50° . They are manufactured in eight focal lengths, from 1 in. to 3 ins., each being capable of covering 35 mm. cine film to the extreme corners. They work at the full aperture of $f/1.9$. Messrs. Dallmeyer undertake to fit these lenses to customers' own 35 mm. cameras at their own works, thus ensuring perfection of setting for infinity, scaling, and centreing.

A special series of the lenses in focal lengths of from 1 to $2\frac{1}{2}$ ins. is available for use for back projection in theatres, and for still photography longer focal lengths up to 6 ins. may be obtained which still retain the large aperture. A special focussing mount is made for the 2-in. lens for use in the standard "O" flange fitted to the Leica camera, and thus enables the camera to be used for specially fast indoor work such as stage plays, etc. Detailed prices may be obtained from the makers upon application.

OBITUARY.

Among those whose deaths have taken place since the 1932 volume of the *BRITISH JOURNAL ALMANAC* was closed for printing are:—

George Eastman (March 14th, 1932, aged 77).

Chapman Jones (March 7th, 1932, aged 77).

Thomas Bolas (March 17th, 1932, aged 84).

Thomas Manly (April, 1932).

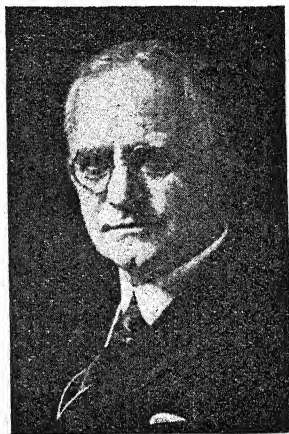
Owen Wheeler (October 5th, 1932).

Arthur C. Brookes (October 25th, 1932).

George Eastman.

The story of George Eastman's career, from a modest beginning to the control of one of the greatest commercial undertakings in the world, became familiar at the time of his death and had previously been told in the biography, "George Eastman" by Carl W. Ackerman. Hence it will suffice to recall that in 1877, when 23, he began to study dry-plate emulsion, then newly invented in England, and two years' later made a machine for emulsion-coating plates. In 1880 he had started in business as a maker of dry-plates. Five years afterwards, with a vision which marked all his career, he introduced "Eastman paper film," and had soon conceived and commercialized a system of photography for the unskilled amateur, embodied in the Kodak cameras and daylight-loading transparent film.

Apparatus and materials for the amateur rapidly developed to an immense business, to which, on the rapid rise of the motion picture, was added the manufacture of negative and positive cinematograph film, at one time almost the monopoly of the Eastman Company.



MR. GEORGE EASTMAN.

As he became wealthy, large sums were given by Mr. Eastman (for many years anonymously) to educational and philanthropic institutions in the United States. During the last few years of his life he endowed dental clinics in London, Brussels, Rome and Stockholm at a cost of nearly £1,000,000. Altogether his donations are estimated to have amounted to £20,000,000. He never married, and on his death his estate was found to be about £5,000,000, most of which, in accordance with his will, was bequeathed to educational institutions.

Chapman Jones.

For many years an authority on photography, on both the chemical and optical sides. He conducted valuable researches on methods of intensification, and was the author of "Science and Practice of Photography," for many years the best work of photographic instruction. He was president of the Royal Photographic Society from 1912 to 1914.

Thomas Bolas.

A most original character with an immense fund of knowledge and whimsical humour. Mr. Bolas was the inventor of the hand or detective camera, for he was the first to construct and show an apparatus of this kind, viz., at the Royal Photographic Society towards the end of 1880. He had an encyclopædic knowledge of all branches of photographic and photo-mechanical work. In the 'seventies he brought out a journal, the "Photographic Review," which he wrote almost entirely himself, also setting up the type with his own hands and printing the edition. The periodical, however, had a very short life.

Thomas Manly.

The inventor of two most distinctive printing processes, namely Ozotype and Ozobrome. The latter in a somewhat modified form and under the name of "Carbro" has become a valuable means of making pigment prints.

Capt. Owen Wheeler.

Capt. Wheeler wrote many books on Army matters, including a history of the War Office, and throughout his long life was an amateur photographer who contributed to progress in

telephotography and colour photography. He was the author of several excellent textbooks.

Arthur C. Brookes.

For many years Arthur C. Brookes was the owner and editor of a trade journal, the "Photographic Dealer," and was also secretary of the British Photographic Manufacturers' Association. He organised numerous photographic trade exhibitions and was among the most popular figures in photographic circles.

Among others whose deaths have taken place during the past year are: Rev. F. C. Lambert, an amateur who contributed to the advancement of photography by his writings; J. C. Warburg, a prominent pictorialist; R. R. Beard, a leading maker of apparatus for lanternists; L. Gandolfi, well known as a camera maker; E. P. Short (Nottingham), and E. R. Yerbury (Edinburgh), professional photographers, and Wallace Fidler, trade artist and finisher.

The deaths have also occurred of Dr. J. Neubronner, a German pharmacist who invented a carrier-pigeon camera; Dr. A. von Hübl, a leading Austrian authority on photographic subjects; Professor O. Mente, head of the photographic division of the Charlottenburg Technical School, and August Albert, an authority on photo-litho and for 25 years head of the photo-mechanical department of the School of Graphic Arts in Vienna.

50 WANTED METHODS

Easing Sticking Dark-Slides.—

However well seasoned wood may be, it is liable to swell and shrink if exposed to damp or heat. It is not advisable to use tools on the wood except a thin file which will go into the groove, if the sticking is very bad. Stop removing the wood before the slides go easily enough for working, and then apply an anti-friction preparation made as follows:—Procure a stout cardboard box, about $1\frac{1}{2} \times 1$ in. and $\frac{1}{2}$ an inch deep. Into it put spermaceti wax, and warm gently on a hot plate, making it as hot as possible without setting it on fire, and then let it cool. If the box is filled completely with wax it can be applied to any part as required whilst still in the box. The wood may be warmed very slightly and any fragments of wax rubbed off with a fluffless cloth.

Velvet on Dark-Slides.—When replacing new velvet strips in dark-slides and the backs of cameras it is well to remember that the glue should be placed on the wood and not on the velvet. The glue should be only tacky when the velvet is applied, for if it is too liquid it will run into the material and set the pile into a hard mass. Ordinary ribbon velvet (as obtained from any draper) should be used. It has a selvage on both sides which prevents

it from fraying. If there is much space to be filled double velveting should be resorted to. This is effected by placing narrow velvet down the middle of the groove, leaving the wood exposed on each side, and afterwards gluing a second strip the full width of the groove on top of the first, rubbing it well down. Sometimes cameras are fitted with a thick plush-like velvet known as Utrecht velvet which is not made in the form of ribbon, but must be cut from the piece.

Ground-Glass Screens.—Carborundum powder, obtainable from any ironmonger, may be relied upon to produce an excellent focussing screen in a very short time, though only the very finest powder obtainable should be used for the purpose. With the exception of the powder, the only other thing required is a "rubber" which consists of a piece of glass fixed with "Seccotine" to a block of wood, which serves as a handle. In use, the glass to be ground is first wetted, a little powder is then thrown upon it, and then the rubber is brought into play. The surface of the rubber soon becomes ground as well as the plate, and it is in this condition that it works the best. The time required for grinding depends on the size of the rubber, but using one about 2×1 ins., a 5×4 screen can be perfectly and completely ground in less

than five minutes. For large screens a larger grinding tool is required which can conveniently be made from a plate-glass trimming shape of suitable size.

Restoring Engraved Scales.—

Provided that markings on focussing scales, lenses, stops, etc., are really engraved and not merely painted on, the pigment with which they were originally filled may be restored. First clean out dirt and grease from letters, figures, and lines with the aid of soap and water and a strong needle. The best black filling is a mixture of lamp black and tallow which is made by melting some tallow and then stirring in enough fine powdered lamp black (artist's quality) to make a stiff black paste when cold. A very little of this is taken on the point of a knife, and pressed into the marks, the surplus being polished off with a smooth cloth on which a trace of dry lamp black has been placed. The scales should finally be cleaned up with a little soap and water applied with a clean cloth. For a white filling, the best material is the white "Fortafix" cement (sold in tubes), which sets very hard and rapidly when exposed to the air. The contents of the tube should first be stirred up well with a wire, which on withdrawal will have sufficient cement adhering to it for the purpose required. Press this well into the marks, and quickly clean off with a clean cloth which has previously been rubbed on a piece of white chalk. A slightly damp cloth will remove the last traces of cement from places where it is not required, but this should be done before the cement has time to set.

Cleaning Lacquer on Cameras.—

Lacquer should never be touched with metal polish of any description, or its lustre will be lost. About 4 ozs. of soft soap should be dissolved in 20 ozs. of boiling water, and allowed to cool, after which 10 ozs. of paraffin should be mixed with it. This mixture should be rubbed well into the brass and then polished off with a soft chamois leather, after which the lacquer should look like new.

Loose Screws in Cameras.—

After apparatus has been in use for some time it is often found that some of the screws become loose in the woodwork and refuse to grip owing to the hole becoming too large. If a fragment of mahogany is taken and shaved off with a sharp penknife so that it is a tight fit in the hole, it may then be "seccotined" and driven in, the projecting end being cut off flush when drying is complete. The screw is then re-inserted, and as a precautionary measure this may be "seccotined" as well. Metal cameras are less likely to cause trouble in this way, but if screws do become loose they also may be "seccotined," when they will be found to hold quite well.

Reflex Mirrors.—The difficulty of replacing reflex mirrors which are silver-surfaced and which have been broken or damaged in any way may be overcome in the following way. A piece of fine plate-glass mirror should be obtained from a glass merchant at the cost of a few pence, cut to the correct size. This should be soaked in methylated spirit, or better still spirits of wine, for at least an hour, in order to remove the opaque varnish from

the silvered side, the process being hastened by rubbing gently with the tips of the fingers until the silvering is clean. Now wipe the surface off gently with a wad of cotton-wool saturated with spirit. If the silver surface now appears to be dull it may be polished lightly with jewellers rouge until the reflected image is perfectly clear. The surface may now be varnished with collodion or dilute negative varnish. A method used in the trade to bring up the polish is to pour boiling water on the silvered surface, though this should be practised on a waste piece of glass before it is attempted with that which is required for the reflex.

Removing Large Lens Cells.—

Large cells, such as those of a condenser or portrait lens, may readily be removed by a device known as the "Spanish windlass." Cut a piece of stout string long enough to go three times round the lens mount, with an inch or so to spare. Knot the ends strongly together and pass the double cord thus formed, once round the mount. Assuming that the lens or condenser is standing upright on a table with the two looped ends pointing in the direction of the operator, then the end on the right-hand side should be passed through the end on the left, and the whole tightened up by pulling the loose end to the right. Through the loop of this loose end a stick is passed, pushing it through far enough to allow it to bear tangentially against the right-hand side of the lens-cell. If the near end of the stick is now turned towards the right, the screw will immediately move, provided

that the mount into which it is screwed is held firmly. If any difficulty is found in holding the mount, it may be necessary to use a second windlass, fitted on the mount, but arranged in the opposite direction.

Ground Glass Substitute.—It sometimes happens that a focusing screen breaks during transit and there is neither time nor opportunity to obtain another screen. In order to overcome the difficulty temporarily, a very effective screen may be improvised by removing a plate from one of the dark-slides, cleaning off the emulsion with hot water and then rubbing over the clean glass with a piece of soap and working it with the finger until the whole is evenly covered.

Watertight-Studio Roofs.—Procure a quantity of the purest linen and some of the best oil paint (colour is of no consequence), cut the linen into strips 3 ins. wide and the length of the sash bars. Now give the bar and glass around it a good coat of the paint, lay the strip of linen on to it, and rub well down with a cloth, applying another good coat of paint on the top. When this is thoroughly dry it should be capable of keeping out all water.

Obscuring Glass.—The following may be used for applying to the inside of studio glass for the purpose of making it translucent and as a substitute for tracing cloth or tissue paper: Two mixtures are made, the first consisting of whiting, 13 ozs.; ultramarine blue, 100 to 120 grs.; gelatine $1\frac{1}{2}$ ozs. water, 24 ozs., and the second of glycerine, $1\frac{1}{2}$ ozs., starch, $\frac{1}{2}$ oz., boiled in water, 10 ozs. Add the first

mixture to the second and brush on when warm with a 3-in. flat paint brush.

Stains on Canvas Blinds.—In order to remove mildew and stains from studio or other blinds, cut 1 lb. of good yellow soap into shavings and boil into a stiff paste with soft (preferably rain) water. Apply this to the stain by rubbing vigorously, and sprinkle with finely powdered potass. carbonate, afterwards spreading the canvas on a flat grass plot to dry for 24 hours. When dry, spray the canvas with rain water and wash, when the stain will have disappeared. The black lettering on shop blinds is usually done by stencilling or painting with an enamel or paint, and if this is the case it will be easily removed by vigorously sponging with any of the following solvents:—Chloroform, carbon tetrachloride, ether or acetone.

To Remove Stoppers.—When a stopper is found to be immovable, it may often be loosened by gripping the neck of the bottle firmly in the left hand, applying the thumb at the same time with a firm upward pressure against one side of the head of the stopper, and smartly tapping the opposite side with a glass tube, e.g., a length of gauge glass. The force should be applied in the direction of the longer axis. The operation may often be expedited by placing a drop of oil or other liquid—according to the nature of the contents of the bottle—on the line at the junction of the stopper and the neck of the bottle; when the stopper is tapped a minute space is momentarily formed into which the

liquid slips and so gradually gets between the stopper and the neck of the bottle, allowing the former to be easily withdrawn.

For Watertight Dishes.—Fixing dishes and sinks may be constructed of wood and lined with Ruberoid sheeting which should be brought up right over the edge of the wooden shell and tacked down on the outside at a depth of an inch or so. There is no need to stick it down in any way, but the corners may be made watertight with a material known as plasticroofing, which may be obtained in very small quantities at any good oil shop or builders' merchants. This material is a thickish tarlike compound, which can be applied with an old knife; it may take two or three days to dry thoroughly. It will resist hypo indefinitely.

Keeping Chemicals.—A very convenient method of keeping a bottle air-tight is as follows. After having fitted an ordinary cork of such a shape and size that it can easily be withdrawn with the fingers, procure a stick of Plasticine and mould it into a flat circular cake about half an inch thick. Put this on the cork, press it, and mould it round the sides of the bottle in the way that ordinary metal capsules are put on bottles. This makes the bottle perfectly air-tight. When the chemical is required the Plasticine may be very easily rolled off, and as easily put back again.

Labels on Bottles.—To preserve indefinitely, first stick on labels with any good paste. Then give a coat of warm size (solution of cooking gelatine in hot water) and leave to become bone dry. Then varnish with "church"

or "crystal" varnish (slow-drying), and put aside for a day or so. Labels thus treated will remain legible for years.

Grinding Patch on Bottle.—A corrosive mixture is sold by large chemical dealers as Sabatier's ink. A little rubbed on a bottle by means of a cork causes a matt patch, which can be written on with pencil.

Brush for Cleaning.—The most effective brush for removing dirt from both granite, vulcanite or composition dishes is one of the short, round, stiff variety used for the purpose of stencilling. Pushed into each corner of the dish and turned round once or twice, it will remove dirt which has dried into the surface of the dish, which is often difficult to get rid of by other means.

Cleaning Glass.—A good mixture for cleaning and polishing the backs of negatives, lantern slide cover glasses or picture frame glass may be made by putting two ounces of methylated spirit, half an ounce of ammonia, and a teaspoonful of tripoli powder into an eight ounce bottle and filling it up with water. A notch should be cut in the cork of the bottle so that a few drops of the liquid may be shaken out as desired. The solution is spread over the glass with a small pad of linen or cotton, and then polished off with a clean duster.

Colouring Electric Bulbs.—A solution is made by mixing the white of an egg, previously beaten to a froth, with 20 ozs. of distilled water, the mixture is then filtered and the surface skimmed free from bubbles. The globes to be coloured are thoroughly cleaned

and polished and are then dipped in the mixture and hung up to dry. When dry, the dipping is repeated and they are again dried thoroughly. The colouring solution is made by dissolving 10 to 30 grs. of any soluble aniline dye in 4 fluid ozs. of collodion, and in this the globes are dipped and hung up to dry. The dipping is repeated if a darker tint is required.

Cleaning Dishes, etc.—Dissolve about $\frac{1}{4}$ lb. potass. bichromate in 40 ozs. cold water and add 4 or 5 ozs. strong sulphuric acid. This corrosive mixture will remove developer and other stains from dishes, measures etc., almost instantly. Can be used again and again until it loses its effect. Must not be used for metal articles.

Making Flashbag.—A simple way of making a bag in which to fire flash powder and catch the smoke is to fix a fireproofed fabric covering on to an old umbrella frame. The handle of the umbrella is first replaced by a fairly long bamboo rod, to which the flash lamp is clamped, about 2 ft. below the ribs. A covering of loosely woven cotton is made as a straight tube like a bolster case, about 2 yds in length, one end being "gored" to fit in a dome-shape over the ribs. The discarded cover of the umbrella may be used as a pattern. All seams should be closely stitched, and a wide hem put round the bottom edge. To allow of recharging the lamp, a short sleeve about twelve inches wide and of the same length is sewn at the lamp level, which may be closed by rolling it up and securing it with a clip. A strong cotton cord is run through the

bottom hem and the bag is then fireproofed by the method given below. When nearly dry the bag should be ironed to close the pores. Black material about one yard in width is tacked down the length of one side to prevent direct light from reaching the lens. The "roof" is finally lined with flannel to protect the thin cotton at this point.

Fireproofing Muslin.—Muslin which is used for diffusing the flash when taking flashlight photographs may be rendered practically fireproof as follows. Two ounces of borax, an ounce of ordinary table salt, and 5 ozs. of sal-ammoniac are dissolved in a quart of boiling water. The fabric is soaked in this solution for about a quarter of an hour, gently squeezed and hung up to dry. Material treated in this way will only smoulder if it should happen to be touched by the flame from a flash.

Flashlight Burns.—Relief from flashlight burns may be obtained by using a poultice made of ordinary soda carbonate and grated raw potato, with sufficient water to form a thin paste. This cold poultice is kept on the burn for a day or so and has a powerful soothing and healing effect, the action of which may be completed by smearing the burnt parts with zinc ointment.

Copying Cracked Prints.—In order to copy a print which is covered with minute cracks, a good plan is to rub powdered chalk into the cracks before the copy is made. If the copy negative is afterwards enlarged it is possible to spot out even the most minute cracks, which will appear white in the enlargement. The chalk, if lightly rubbed in,

will not injure the print, and can be brushed out when it has served its purpose.

Holding Originals.—When copying unmounted prints or mounted ones with only a tiny margin of mount it is often difficult to fix them to the copy-board without sticking pins through the edges. In order to overcome this difficulty worn-out razor blades may be used in such a way that they just cover the extreme edges of the prints, and push-pins are then driven into the board through the holes in the blades. The edges of the blades are too thin to throw any shadow, but give sufficient grip to hold the print securely.

Drying Marks on Negatives.—Drying marks on negatives which have been caused through the negative having become splashed with water, or with rain-drops, may often be removed by bleaching in an ordinary ferricyanide and bromide bleaching bath and then re-developing with amidol.

Removing Ink Stains.—Removal of ink stains from any gelatine surface is always a delicate process; one of the best methods is that of treatment with bromine water (heavy deep red liquid). The bromine may be purchased from any of the big chemical dealers in sealed tubes containing about 1 cc. The tube is put in a bottle containing say 10 ozs. of water, where it can be readily broken and the contents dissolved by shaking the stoppered bottle, so preventing the escape of the unpleasant fumes. When the ink-stained print or negative is placed in this solution, the stain is decolourised and rendered soluble,

whilst the silver image is converted into silver bromide, that is to say bleached white. The application of a developer, following exposure to daylight, will convert the silver bromide again into silver, restoring the negative or print to practically its original density and contrast, but minus the ink stain.

Marking Plates.—To mark plates before development, use a grease pencil, sold for writing on china or glass, obtainable from any dealer in artist's materials. The markings may be made boldly on the glass side of the plate, and will not be removed by developing, etc., though they may be wiped off quite easily when they have served their purpose.

Silver from Fixing Baths.—To throw down the silver from waste hypo baths, liver of sulphur is used. The chemical is dissolved to a strong solution and is added to the hypo baths which have been allowed to accumulate to the bulk of, say 20 to 30 gallons, in a wooden cask. As the solution is added the hypo is stirred vigorously with a flat piece of wood, as long as a dark precipitate is thrown down. With acid baths there is the foul smell of sulphuretted hydrogen, though this can be largely prevented by adding caustic potash or caustic soda solution along with the liver of sulphur. Even if the caustic is added, the operation should be carried on outdoors. The sludge of silver sulphide is given a day or two to settle thoroughly, the clear liquor is then run off with a siphon tube and then the cask may be re-filled with waste hypo, and the operation of throwing down silver

repeated. When sufficient sludge has accumulated at the bottom of the cask, it is removed, and spread out to dry, after which it is sent to the refiners.

Cement for Films.—Films may be fixed down on to glass by means of a cement composed of a mixture of gelatine and acetic acid. If the acid is slightly warmed it will take up a similar weight of gelatine, if it is then rather thick for convenient use it may be diluted with more of the acetic acid. The cement may be applied thinly round the edges of the film, and when it becomes tacky the film may be firmly pressed down on to the glass and held there in position until adherence is assured. After printing, the films may be removed from the glass by inserting a razor blade between film and plate.

Removing Gelatine from Films.—Squeegee the film face downwards on to a rubber-surfaced sheet of glass or celluloid, and then immerse the film with its emulsion coating thus protected in a 5 per cent. solution of sulphuric acid, kept at 100-110 deg. F. In this acid bath the back coating of the film is dissolved in about 15 minutes. After washing and drying, the film is stripped off. The glass or celluloid sheet is prepared by giving it two or three coatings with a brush of good rubber cement diluted with benzole to a fairly viscous fluid. When a celluloid sheet is used, it is best to add also 5 per cent. of amyl acetate to this rubber-coating preparation, thus leaving a slightly tacky dry surface on which the film is carefully rubbed and squeegeed down.

Test Plate for Focussing.—A very good test-plate for use in the enlarging carrier in place of the negative may be made from a cleaned-off negative of the correct size, and some fine black sewing cotton or silk. The cotton is wrapped round and round the glass, keeping each turn about an inch from the previous one, and it is then wound the other way so as to form two series of crossing lines. One side of the plate is then flowed over with a clear varnish, or warm solution of gelatine, so that the threads are imbedded on one side, the threads on the other side being then cut away. The fine threads allow of a very fine focus being secured.

Diffusion in Enlarging.—Instead of the usual chiffon or bolting-silk for obtaining diffusion in enlargements, a sheet of plain glass may be used. The glass is held immediately in front of the lens and a slight angular motion is imparted to it during the exposure, thus introducing a slight movement of the image and giving quite a form of diffusion different from that obtained by other methods. The effect may be controlled by increasing the thickness of the glass, and altering the angle at which it is turned.

Bas-Relief Effects.—Prints or enlargements of realistic bas-relief effect are made as follows :—A transparency is first made on either glass or film by contact from the original negative, taking care to get it as near as possible to the same density and contrast as the original. When the transparency is dry, it is placed in contact, film to film, with the original negative, and the two are held up to the light to

register the two images. One of the two plates is then moved slightly to one side, out of register, and the two are then bound together with adhesive strips. The composite negative may then be enlarged or printed by contact, the result having the appearance of a bas-relief illuminated by a strong side light.

Waterproof Netting.—Mosquito netting when stretched on suitable frames for drying prints, usually has a very short life, on account of the fact that it becomes rotten owing to the continual contact of wet prints. To render such fabric waterproof two solutions should be prepared, the first containing 3 lbs. of alum to a gallon of soft water, and the second, 1 lb. of lead acetate to half a gallon of soft water. The two solutions should be mixed together thoroughly and the precipitate allowed to settle, when the material may be soaked in it for about 20 minutes. When the soaking is complete, wring the material lightly and hang it out in the shade to dry. This treatment renders the netting perfectly waterproof, and if desired prints may be laid face downwards on it without any fear of adherence. In this way they will dry without curling.

Packing Large Photographs.—In order to ensure that pictures on large mounts may be sent by post without injury a good method of packing is to obtain a stout piece of strawboard about 2 ins. larger each way than the prints and to attach strips of wood about $\frac{1}{4}$ in. wide, all round the edge with ordinary tin-tacks, so as to make a shallow tray. The prints are

then wrapped in stout brown paper, placed in the tray, and a second piece of strawboard is then tacked in position on the top, the whole then being wrapped in paper.

Airtight Framing.—When framing pictures, they may be isolated from injurious fumes such as gas fumes, etc., in the following way: The glass of the frame is first secured in the rabbet with strips of good-quality paper stuck on with paste, after which the picture is put in, backed up with a closely-fitting backboard secured with brads. A piece of stout brown paper is then fastened with glue to the back of the frame only, after it has been damped and allowed to expand. Care should be taken to see that the paper does not adhere to the backboard, so that, if at any time the latter shrinks, no fumes will get in.

Brown Oak Frames.—A stain may be prepared from Vandyke crystals and washing soda, suitable for staining oak. Powder Vandyke brown is not suitable, as it clogs the grain of the wood and destroys the pattern. The crystal variety may be obtained from most of the larger colour stores. To make the stain, mix 2 or 3 ozs. of the brown crystals with a handful of washing soda, which should then be placed in a saucepan with half-gallon of water, brought to the boil, and kept boiling until thoroughly dissolved. The mixture may then be bottled for use. It may be mixed with further water according to the depth of colour required. If applied hot, it sinks more deeply into the wood, though it is quite efficient when used cold. The stain should be

well rubbed into the wood with a short bristle brush, and if desired, the stained frame, when dry, can be well rubbed over with a little linseed oil, which gives a semi-polish and imparts a lustre to the colour.

Restoring Daguerreotypes.—These delicate pictures fade because of a film of tarnish, or iridescence, which may be removed by means of hydrochloric acid, in the following way. Hold the Daguerreotype in as horizontal position as possible over a sink, or basin and pour sufficient pure strong hydrochloric acid over, just to cover it. The iridescence disappears almost instantly, and the plate is then washed, first in ordinary, and then in distilled water. In the course of washing, the plate, which has up to this moment been held by means of pliers, may be taken in the hand, while the ends of the pliers are rinsed, to get rid of any acid on them. The plate is next dried so that the moisture disappears from one side or corner to the opposite side in one sweep without halt or stoppage. To secure this, the plate is held over the flame of a gas ring or rose burner with the corner held by the pliers slightly lower than the opposite corner. As soon as one corner begins to dry, the plate is held nearly upright, with the plier side still kept low, and if the plate is of the correct heat the drying will continue (without stopping) in an even wave from top to bottom. If the drying becomes so slow that there seems a danger of a halt, which might give rise to a line, make it hot from the top downwards, or assist the drying by blowing, or do both

until the plate is dry all over. The object of the distilled water is to prevent the deposition on the plate of traces of the lime and other salts contained in ordinary tap water, but the distilled water should be examined, by holding it up to the light; if any floating particles are to be seen they should be removed by filtration.

Magic Photographs.—Magic photographs may be made by printing the desired picture on to bromide paper preferably of a matt surface and then bleaching out the image in a solution of mercury bichloride. The prints may be dried and kept for any reasonable time, if washed in water for a few minutes. To bring up the picture in its full depth, ordinary hypo, as used for fixing prints, is employed. Any cheap paper may be soaked for a minute or so in hypo solution of about 10 per cent. strength, and then hung up to dry. In order to make the image re-appear, wet the print and to press it firmly into contact with paper containing the hypo for a couple of minutes, when the image will come up to its original strength.

Double-Pose Portraits.—These photographs which consist of the same person speaking, or drinking with himself, or appearing twice in the same photograph in a different position, may be obtained in several different ways. One of the

simplest methods to employ is to fit an open-ended square box into the back of the camera, the inside dimensions of which should be approximately the same size as the focussing screen, and of a depth of about 3 ins. The box should be well blacked inside and the front end provided with a rebate and turn-bottoms to allow a mask of thin metal or black card to be held in the front of the box for the purpose of covering about half the aperture. In order to obtain the photograph, one half of the plate is masked in the way described, and a photograph obtained of the sitter on the unmasked portion of the plate. Both subject and mask are moved to the opposite side and another exposure made. If care is taken to keep the exposures equal and to use a suitable background the join between the two exposures will be difficult to detect.

Cleaning Arc Lamp Glasses.—To remove the hard deposit on the cylinders of enclosed arc lamps, try rubbing with methylated spirit. If the whole of it cannot be removed in this way a swab over the surface with dilute hydrofluoric acid will restore the original clearness of the glass. The acid must be kept in a gutta-percha bottle, and applied with a piece of sponge attached to a stout stick, great care being taken to avoid contact with the skin.



ORTHOCHROMATIC PROCESSES

Colour Sensitisers.

Sensitol Red and Sensitol Violet both sensitise strongly for red, orange and bright (yellowish) green. Sensitol Green sensitises strongly for the whole of the blue-green, yellow-green, and yellow, and well into the orange-red.

Plates treated with the red or violet dye may be handled by the light of a safe-lamp transmitting only bluish-green light between $\lambda 50$ and $\lambda 52$, but no other light is permissible. Plates treated with Sensitol Green may be handled by a deep ruby light.

A clean working plate, and in the case of Sensitol Violet a slow plate, such as Ilford Ordinary or Empress, should be selected for treatment in order to obtain sensitised plates free from veil.

Stock Solutions.

In making these it is preferable to dissolve the dye first in part of the solvent (heated), and then to dilute to the requisite strength. The Sensitol Red is made up to 1:1000 and the Sensitol Violet up to 1:5000 with alcohol or industrial spirit.

Sensitol Green is also made up to a strength of 1:1000, but a quarter of the solvent, in

which the dye is first dissolved, should preferably be methyl alcohol or wood spirit, the remainder being alcohol or industrial spirit.

All these solutions keep indefinitely in the dark; there is, however, a tendency for Sensitol Red to crystallise out at low temperatures, in which case it should be re-dissolved by careful warming.

Bathing Process.

The actual sensitising baths may be obtained by diluting the stock solutions with water (red and green dyes only) or with spirit.

Aqueous Dye Bath.

Distilled water, 1,000 parts; stock dye solution, 15-20 parts.

Bathe for about 3 minutes, wash well in running water or frequent changes for several minutes, and then dry - as quickly as possible in a current of warm dry air free from dust.

Alcohol Dye Bath.

	<i>Red.</i>	<i>Green.</i>	<i>Violet.</i>
W ...	500	500	500
S ...	250	250	200
D ...	10	15	50

W is distilled water; S, industrial spirit; D, stock dye solution.

Bathe for about 3 minutes, and then dry, without washing, in a current of dry air; this must be cool in the case of the Sensitol violet dye.

All the above operations should be conducted in darkness or in a minimum of deep red light (in the case of Sensitol Green) or of bluish-green light (for Sensitol Red or Sensitol Violet).

The aqueous baths gradually deteriorate on keeping.

The alcoholic baths keep in good condition and may be renewed, after use or after long storage, by the addition of a little stock dye solution.

Safelights.

The following formulæ are for safelight screens made by coating glass with gelatine solution containing a dye. They are suitable for use with electric light, but the screens are liable to fade and become unsafe when used as filters of daylight.

Throughout, the gelatine is one of 6 per cent. strength (60 gms. dissolved in 1,000 c.c.s. water). Each dyed solution is applied in the proportion of 7 c.c.s. per 10 square inches of glass.

Each safelight is made by binding together two coloured gelatine-coated glasses film to film, with or without insertion of white tissue or other paper according as direct or diffused light is desired.

Bright Yellow.

For Lantern Plates or Gaslight Papers.

Gelatine solution ... 500 c.c.s.
(Naphthol Orange, 4 gms., dissolved in 100 c.c.s. water.)

Orange.

For Bromide Papers.

I.—Gelatine solution 100 c.c.s.
Tartrazine ... 0.8 gm.
II.—Gelatine solution 100 c.c.s.
Rose Bengal... 0.3 gm.
(I. and II., bound film to film, form the safelight.)

Red.

For Ordinary and Yellow-Green Sensitive Plates.

Gelatine solution ... 500 c.c.s.
Dark-Room Red
(Höchst) ... 4.5 gms.
(dissolved in 100 c.c.s. water.)

Green.

For Ordinary and Yellow-Green Sensitive Plates.

Gelatine solution ... 500 c.c.s.
Dark-Room Green
(Höchst) ... 4 gms.
(Dissolved in 100 c.c.s. water.)

Dark Red.

Relatively safe for Panchromatic Plates.

Gelatine solution ... 500 c.c.s.
Dark-Room Dark
Red (Höchst) ... 4.5 gms.
(Dissolved in 100 c.c.s. water.)

Dark Green.

For Panchromatic Plates.

Naphthol green 61 grs.
(8 gms.)
Filter blue soln. $\frac{1}{2}$ oz.
(32 c.c.s.)
Gelatine (8%) ... 16 ozs.
solution (1,000 c.c.s.)

The filter blue solution is prepared by dissolving 0.1 gm. (0.77 grs.) of filter blue in 1,000 c.c.s. (16 ozs.) of water, and adding 1 c.c. (7.7 grs.) of ammonia. Of the mixed solution allow 7 c.c.s. per 100 sq. cm. (750 minims per 100 sq. ins.)

NEGATIVE DEVELOPERS.

Weights and Measures.

In all formulæ the metric weights are not equivalents of the British item for item, but each formula gives a solution of the same composition.

Desensitising.

Various safranine dyes, notably pheno-safranine, may be employed in the form of a 1:2000 solution for the desensitising of sensitive materials in a preliminary bath before development. Alternatively, this solution may be added to the working developer in the proportion of 1 part to 10 parts of developer.

After an immersion of at least one minute, all plates and films of moderate speed and colour-sensitiveness may be safely developed by screened white light or by a bright yellow safelight. Ultra-fast and panchromatic plate still require care; the behaviour of the latter varies with the mode of sensitising and may necessitate a feeble white light in preference to a red safelight.

With a safranine-treated plate a hydroquinone developer becomes as quick-acting as metol; M.Q. is almost unaffected; pyro-soda and amidol are slightly restrained, the Watkins factor being depressed by one third.

The pink stain produced by these desensitisers has no effect in printing, even when uneven, but may be removed by treating the negative with a weak solution of nitrous acid:—

Sodium nitrite ...	50 grs.
	(6 grms.)
Hydrochloric acid	100 mins.
	(12 c.c.s.)
Water ...	20 ozs.
	(1,000 c.c.s.)

Immerse for 5 minutes; remove the resulting blue compound by 5 minutes' washing.

PINACRYPTOL-GREEN.

Used as a 1:5000 solution pinacryptol-green acts as efficiently as safranine with ordinary plates and more so with colour-sensitised plates. It also requires at least 1 minute's immersion and may be used in the developer by adding 5-10 drops of stock 1:500 solution to each ounce of developing solution.

Like safranine, pinacryptol similarly energises hydroquinone, has little effect with M.Q. or pyro, and markedly restrains the amidol developer.

The extent to which panchromatic plates are desensitised varies according to their mode of sensitising; many forms can, however, safely be developed by bright red or yellow safelight.

Amidol.

While amidol is pre-eminently a developer for bromide paper it can be used for plates, with which it gives somewhat soft negatives. Its chief drawback is that the ready mixed developer does not keep at all well. The average formula is—

Amidol ...	2-3 grs.
	(4.5-7 grms.)
Soda sulphite ...	25 grs.
cryst.	(57.5 grms.)
Water, to make	1 oz.
	(1,000 c.c.s.)

It is best to use the developer on the same day that it is made up, although the solution can be used during the next day or two. Especially for prints, it is best to dissolve the sulphite when making up the developer.

AMIDOL TO KEEP.

A method of making amidol developer which will keep for several weeks in good working condition is as follows: A solution is made of sulphite and metabisulphite, viz.:—

Soda sulphite	4 ozs.
cryst.	(200 gms.)
Potass. meta-	$\frac{1}{2}$ oz.
bisulphite	(25 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

It is best to boil this mixture after having dissolved the chemicals in moderately hot water. Boiling is not essential, but it improves the keeping qualities of the solution. The developer is made by taking:

Amidol ...	40-60 grs.
	(4.5-7 gms.)
Stock sulphite ...	4 ozs.
solution	(200 c.c.s.)
Water, ...	20 ozs.
to make	(1,000 c.c.s.)

Azol.

For Plates and Films:—

Normal exposures.

Azol ...	$\frac{1}{2}$ oz.
	(5 c.c.s.)
Water ...	6 ozs.
	(120 c.c.s.)

Under-exposures.

Azol ...	$\frac{1}{2}$ oz.
	(5 c.c.s.)
Water ...	8 ozs.
	(160 c.c.s.)

Over-exposures.

Azol ...	$\frac{1}{2}$ oz.
	(5 c.c.s.)
Water ...	4 ozs.
	(80 c.c.s.)

For stand development:—

Azol, 1 oz.; water, 100 ozs.

For tank development:—

Azol, $\frac{3}{4}$ oz.; water, 40 ozs. Time of development of films at 60 deg. F., 20 to 30 minutes. This solution may be used several times in succession

Ferrous Oxalate.

A.—Potass. oxalate (neutral), 5 ozs.; hot water, 20 ozs. Cool, and pour off clear liquid.

B.—Warm water, 20 ozs.; sulphuric acid, 30 minims; sulphate of iron, 5 ozs.

Mix 1 oz. of B with 3 to 4 ozs. of A (pouring B into A).

Chlorquinol-Metol.
(Johnson's)

Metol ...	16 grs.
	(1.8 gms.)
Chlorquinol ...	48 grs.
	(5.5 gms.)
Soda sulphite,	1 oz.
cryst ...	(50 gms)
Soda carbonate	1 oz.
cryst	(50 gms.)
Potass bromide	4 grs.
	(0.5 gm.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

Dilute with equal bulk of water, for plates, films and bromide papers. For gaslight papers, use as above.

Glycin.**ONE-SOLUTION (HÜBL).**

Boiling water ...	4 ozs.
	(1,000 c.c.s.)
Sodium sul-	2½ ozs.
phite, cryst.	(625 gms.)

When dissolved, add—

Glycin ...	1 oz.
	(250 gms.)

And then in small quantities—

Potass. car-	5 ozs.
bonate	(1,250 gms.)

This forms a thick cream, which must be well shaken, and then diluted with water; for normal work, dilute 1 oz. with 12 or 15 ozs. of water; for very soft results, with 30 ozs. of water.

Glycin is a slow-acting developer, which keeps for a very long time, and yields negatives perfectly free from stain. It is the best developer for "Stand Development" (which see).

Hydroquinone.

Made up with soda carbonate (as per the first formula below) hydroquinone is a rather slow-acting developer. The caustic-soda formula is quicker, but easily gives excessive density and contrast; it is best suited for line drawings or subjects where full contrast is required.

ONE-SOLUTION.

Hydroquinone ...	100 grs. (11.5 gms.)
Soda sulphite ...	1½ ozs. (75 gms.)
cryst.	
Soda carbonate	3 ozs. (150 gms.)
cryst.	
Water, to make	20 ozs. (1,000 c.c.s.)

May be diluted with an equal volume of water.

This formula is not so quick in action as the next one, but there is less tendency for the great density in the high-lights which is easily produced in cases of under-exposure. In all cases the temperature of the hydroquinone developer should not be allowed to fall below 60 deg. F. (15° C.), otherwise the solution becomes inert.

ONE-SOLUTION (FORMALINE).

Hydroquinone ...	130 grs. (15 gms.)
Soda sulphite ...	6 ozs. (300 gms.)
cryst.	
Formaline ...	3 drs. (20 c.c.s.)
Water, to make	20 ozs. (1,000 c.c.s.)

A slow developer, giving great clearness in the shadows, and plenty of density in high-

lights, and specially suitable for line-subjects.

TWO-SOLUTION (CAUSTIC SODA).

A. Hydroquinone	160 grs. (18 gms.)
Soda sulphite	2 ozs. (100 gms.)
cryst.	
Citric acid ...	60 grs. (7 gms.)
Potass. bromide	40 grs. (4.5 gms.)
Water, to make	20 ozs. (1,000 c.c.s.)
B. Caustic soda	160 grs. (18 gms.)
(stick)	
Water, to make	20 ozs. (1,000 c.c.s.)
For use:—A, 1 oz.; B, 1 oz.; water, 2 ozs.	

Metol.

ONE-SOLUTION.

Metol ...	150 grs. (17 gms.)
Soda sulphite	2½ ozs. (125 gms.)
cryst.	
Soda carbonate	3½ ozs. (175 gms.)
cryst.	
Potass. bromide	16 grs. (1.8 gms.)
Water, to make	20 ozs. (1,000 c.c.s.)

For portraits, take stock solution, 1 oz.; water, 1 oz. For landscapes, stock solution, 1 oz.; water, 2 ozs.

TWO-SOLUTION.

A. Metol ...	150 grs. (17 gms.)
Soda sulphite	2½ ozs. (125 gms.)
cryst.	
Water, to make	20 ozs. (1,000 c.c.s.)
B. Soda carbon-	3½ ozs. (175 gms.)
ate, cryst.	
Potass. bromide	16 grs. (1.8 gms.)
Water, to make	20 ozs. (1,000 c.c.s.)

For portraits, A, 1 oz.; B, 1 oz. For landscapes, A, 1 oz.; B, 1 oz.; water, 1 oz.

Metol gives delicate negatives with great detail and little density unless development is greatly prolonged.

In making up all metol developers, dissolve the metol first, then the sulphite, and then the other chemicals, using warm but not hot water.

Metol-Hydroquinone.

ONE-SOLUTION.

Metol	35 grs. (4 gms.)
Soda sulphite cryst.	2 ozs. (100 gms.)
Hydroquinone ...	50 grs. (5.7 gms.)
Potass. bromide	15 grs. (1.7 gms.)
Soda carbonate cryst.	1½ ozs. (75 gms.)
Water, to make	20 ozs. (1,000 c.c.s.)

This is mixed with an equal volume of water at the time of use.

Dissolve the chemicals in metol-hydroquinone developers in the order given in the formulæ.

TWO-SOLUTION.

A. Metol	40 grs. (4.5 gms.)
Soda sulphite cryst.	120 grs. (14 gms.)
Hydroquinone	50 grs. (5.7 gms.)
Potass. bromide	15 grs. (1.7 gm.)
Water, to make	20 ozs. (1,000 c.c.s.)
B. Soda carbonate, cryst.	½ oz. (25 gms.)
Water, to make	20 ozs. (1,000 c.c.s.)

Mix in equal parts.

In cold weather it is best to increase the quantity of metol to, say, 60 grs. (6.8 gms.), and reduce the hydroquinone to, say, 30 grs. (3.4 gms.).

Metol Poisoning.

Metol (among other developers) has a poisoning effect on the skin of many people, causing painful sores and irritation.

The following ointment has a very beneficial effect in such cases:—

Ichthyol	... 10 grs.
Lanoline	... 40 grs.
Boric acid	... 40 grs.
Vaseline...	... 30 grs.

Apply two or three times a day, and rub in well before retiring for the night.

Metol Staining.

The stains on the skin and finger-nails produced by metol developers may be prevented as follows:—

The fingers are dipped before starting and fairly frequently while developing in:—

Water	10 ozs.
Hydrochloric acid	10 drops.

The acid stops the action of the developer by neutralising the alkali in the same way that an acid stop-bath does with prints.

If used constantly this bath will also be found to be an effective preventative of metol-poisoning.

Paramidophenol.

A. Paramidophenol	¾ oz. hydro-chloride (75 gms.)
Water, hot ...	6 to 7 ozs. (600 to 700 c.c.s.)

Filter this solution, if necessary.

B. Soda, sulphite	45 grs. (10 gms.)
Soda carbonate, dry	150 grs. (35 gms.)
Water	... 2 ozs. (200 c.c.s.)

Add B. to A. The paramidophenol base is thrown down.

When mixture is cool, filter off the deposit on cloth, and let the paste dry until its bulk is not more than 3 ozs. (300 c.c.s.)

Then, in a graduate, mix it with 1 oz. (100 c.c.s.) of soda bisulphite lye 35° B. and add strong solution of caustic soda of 40° B. (about 50 per cent.) until the base is just dissolved. Water is then added to make 5 ozs. (500 c.c.s.). The solution is diluted 20 to 30 times for use.

Two-SOLUTION.

A. Paramido-	200 grs.
penol hydro-	(23 grms.)
chloride	
Potass meta-	100 grs.
bisulphite ...	(11.5 grms.)
Distilled water	20 ozs.
to make	(1,000 c.c.s.)
B. Soda sulphite...	1½ ozs.
	(62.5 grms.)
Potassium car-	1½ ozs.
bonate	(62.5 grms.)
Distilled water	20 ozs.
to make	(1,000 c.c.s.)

For use, mix 1 oz. of A with 2 ozs. of B.

Pyro-Soda.

B.J. Non-staining Formula.

Make up two solutions according to the following formula:

A Pyro	1 oz.
	(50 grms.)
Soda sulphite	8 ozs.
cryst	(400 grms.)
or anhydrous	4 ozs.
	(200 grms.)
Potass. meta-	1 oz.
bisulphite	(50 grms.)
Water	60 ozs.
	(3,000 c.c.s.)
B Soda carbon-	12 ozs.
ate, cryst.	(600 grms.)
or anhydrous	4½ ozs.
	(225 grms.)
Water	60 ozs.
	(3,000 c.c.s.)

Mix A, 1 part; B, 1 part; water, 2 parts.

In making the A solution the sulphite and metabisulphite should be mixed together dry, and put together into hot water. When they are dissolved, the solution should preferably be brought to the boil and boiled for about a minute, after which the pyro is dissolved—when the solution has cooled. The boiling greatly improves the keeping qualities of the solution.

If preferred the sulphite and metabisulphite can be dissolved in only half the water and the necessity of heating or boiling so much solution thus avoided. The second half can be added cold, and the pyro then dissolved.

This developer will produce negatives free from pyro stain, and 4 to 6 minutes development at normal temperature with full exposure will yield soft negatives full of detail and well suited to enlarging. The advantages of the developer are its cleanliness and the extraordinary keeping qualities of the A solution, which must be made up as directed above.

When stronger negatives are required the developer can be made up by taking equal parts of A, of B, and of water, or equal parts of A and B alone can be used, this giving a developer containing about 4 grains pyro to the ounce.

The mixed solution can be used for several plates in succession if a little extra time is given for development in each case.

Ordinary Formula.

The following is a formula for the pyro-soda developer on the lines recommended by most of the British plate makers, *i.e.*,

with metabisulphite only as the preservative of the pyro in the A solution; with sulphite in the B solution in amount generally equal to that of the soda carbonate therein:—

- A. Potass. meta- 30 grs.
bisulphite (3.5 grms.)
Water, to make 20 ozs.
(1,000 c.c.s.)
Pyro ... 1 oz.
(12.5 grms.)
- B. Soda carbon- 2 ozs.
ate, cryst. (100 grms.)
Soda sulphite, 2 ozs.
cryst. (100 grms.)
Potass. bro- 10 grs.
mide (1 gm.)
Water, to make 20 ozs.
(1,000 c.c.s.)
Mix equal parts of A and B.

Pyro-Ammonia.

(10% SOLUTIONS.)

- A. Pyro ... 1 oz.
(100 grms.)
Potass. meta- 1 oz.
bisulphite (100 grms.)
Water, to make 9 ozs.
(1,000 c.c.s.)

Instead of the metabisulphite 4 ozs. (400 grms.) soda sulphite cryst. may be used.

- B. Potass. ... 1 oz.
bromide (100 grms.)
Distilled ... 9 ozs.
water to (1,000 c.c.s.)
- C. Liquid am- 1 oz. (fl.)
monia (0.880) (100 c.c.s.)
Distilled ... 9 ozs.
water, to make (1,000 c.c.s.)

To make a normal developer, take A, 20 minims; B, 10 minims; C, 30 minims; water to 1 oz.; or if no bromide is used, A, 20 minims; C, 10 minims; to water, 1 oz.; or in metric measures, A, 2 c.c.s.; B, 1 c.c.; C, 3 c.c.s.; water to 50 c.c.s.

Pyro-Metol.

- A. Pyro ... 80 grs.
(9.2 grms.)
Metol ... 70 grs.
(8 grms.)
Potass. meta- 180 grs.
bisulphite ... (20 grms.)
Potass. ... 30 grs.
bromide (3.5 grms.)
Water, to make 20 ozs.
(1,000 c.c.s.)
- B. Soda carbonate 3 ozs.
cryst. (150 grms.)
Water, to make 20 ozs.
(1,000 c.c.s.)

For normal exposures, use equal parts. For under-exposures, increase the proportion of B and add water.

Pyro-metol is a developer which gives both detail and density quickly. The negatives are of slightly greenish-black colour, of good printing quality.

Pyrocatechin.

ONE-SOLUTION.

- Soda sulphite, 5 ozs.
cryst. (250 grms.)
Water, to make 20 ozs.
(1,000 c.c.s.)
Caustic soda ... 260-300 grs.
(30 to 34.5 grms.)
Pyrocatechin ... 400 grs.
(46 grms.)

The chemicals are dissolved in this order, and the stock solution kept well corked. It is diluted with 20 times its volume of water for use. An extremely energetic developer, suitable for under-exposures. Very clean-working and tending to soft contrasts.

TWO-SOLUTION.

- A. Pyrocatechin ... 175 grs.
(20 grms.)
Soda sulphite, 1 1/2 ozs.
cryst. (75 grms.)
Water, to make 20 ozs.
(1,000 c.c.s.)

- B. Potass. ... $2\frac{1}{2}$ ozs.
carbonate (125 grms.)
Water, to make 20 ozs.
(1,000 c.c.s.)

Equal parts are mixed together. A slow-acting developer.

Maximum-Contrast Hydroquinone.

- A. Soda bisulphite ... 375 grs.
(25 grms.)
Hydroquinone 375 grs.
(25 grms.)
Potass. bromide ... 375 grs.
(25 grms.)
Water to make 32 ozs.
(1,000 c.c.s.)

- B. Caustic soda ... $1\frac{1}{2}$ ozs.
(45 grms.)
Water, to make 32 ozs.
(1,000 c.c.s.)
For use, mix A and B in equal parts.

For Contrasty Subjects.

- A. Pyrocatechin ... $\frac{1}{2}$ oz.
(2 grms.)
Water, to make $12\frac{1}{2}$ fl. ozs.
(100 c.c.s.)
B. Potass. carbonate ... $2\frac{1}{2}$ ozs.
(20 grms.)
Water, to make $12\frac{1}{2}$ fl. ozs.
(100 c.c.s.)

For use, take 1 part of A, 1 part of B and 3 parts of water; the mixed solution to be used only once, immediately it is prepared. Produces a brown tone which may be effectively employed for bromide or gas-light prints.

M.-Q. for Under-Exposures.

This "maximum-energy" developer is recommended by the Eastman Laboratory as the best known for under-exposed negatives.

- Soda sulphite, ... 2 ozs.
anhydrous ... (60 grms.)
Elon (E.K. ... 250 grs.
Metol) (16 grms.)
Hydroquinone ... 250 grs.
(16 grms.)
Caustic soda ... 150 grs.
(10 grms.)
Potass. bromide 150 grs.
(10 grms.)
Water to make... 32 ozs.
(1,000 c.c.s.)
Wood or denatured alcohol $1\frac{1}{2}$ ozs.
(45 c.c.s.)

If excessive contrast results reduce the negative with per sulphate.

Fine-Grain Developer.

- Metol ... 18 grs.
(2 grms.)
Soda-sulphite, 2 ozs.
dry ... (100 grms.)
Hydroquinone ... 45 grs.
(5 grms.)
Borax ... 18 grs.
(2 grms.)
Water, to make 20 ozs.
(1,000 c.c.s.)

Film Quantity Developer.

The following metol-hydroquinone-pyro formula of the Kodak Co., is known as D75 and is for tank development of roll-film, etc., in about 10 minutes.

In making up 10 gallons of developer, 2 gallons of water are placed in the tank, Sol'n No. 1 added, then Sol'n No. 2, then No. 3 and No. 4—with thorough stirring after adding each. Finally add water to make 10 gallons, again with thorough stirring.

Solution No. 1.

- Water (125° F.) ... 1 gall.
Elon (Metol) ... $1\frac{1}{2}$ ozs

Solution No. 2.

Water (125° F.)	... 1 gall.
Soda Sulphite (cryst.)	1 lb.
Sodium bisulphite	... 15 ozs.

Solution No. 3.

Water (160° F.)	... 1 gall.
Soda sulphite (cryst.)	14 ozs.
Hydroquinone	... 5 ozs.
Pyro	... 1½ ozs.

Solution No. 4.

Water (125° F.)	... 1 gall.
Soda carbonate (cryst.)	5 lbs.

The developer should be kept at 68° F., never below 65° nor above 70°. For each degree above or below 68° allow one minute less or more in time of development. Time at 68° is 10 minutes.

For strengthening developer after use, a stock solution is kept at hand, viz. :—

Water (125° F.)	... 1 gall.
Elon (Metol)	... 1½ ozs.
Soda sulphite (cryst.)	15 ozs.
Soda bisulphite	... 7½ ozs.
Hydroquinone	... 2½ ozs.
Soda carbonate (cryst.)	3 lbs.
	6 ozs.
Water to make	... 2 galls.

A portion of this stock is mixed with an equal bulk of water before adding to the solution in the tank. Enough of this (diluted) solution is added to bring the tank developer back to its original volume.

Capacity of Tanks.

One cubic inch equals about 278 minims (16·4 c.c.s.) equal to ·58 oz. or ·0036 gallon (Imperial). Therefore the capacity of a tank can be ascertained by measuring the width, breadth and depth in inches, multiplying the three figures together. This

gives the capacity in cubic inches. To find the capacity in ozs., multiply by 4 and divide by 7. To find the capacity in gallons, multiply by ·0036 or divide by 280.

Stand Development.

Glycin is a very suitable developer for this purpose, and the following directions are given for the use of the Hübl formula (given on another page) for a concentrated solution.

Normal developer:—Stock sol., 1 oz. ; water, 80 to 90 oz. ; potass. bromide, 10 per cent. sol., 80 minims.

In this solution a properly exposed plate should make its appearance in 15 or 20 minutes, and obtain full density in several hours.

For under-exposures :—Stock sol., 1 oz. ; caustic soda sol. (10 per cent.), 1 oz. ; water, 50 oz., warmed to 75 deg. F.

For over-exposures :—Stock sol., 1 oz. ; potass. bromide (10 per cent. sol.), 1 oz. ; water, 25 oz.

Developer-Fixer.*Ferrotypes.*

Hydroquinone	... ¾ oz. (21 gms.)
Soda sulphite, cryst.	2½ ozs. (78 gms.)
Soda carbonate, cryst.	2 ozs. (56 gms.)
Hypo	... 6 ozs. (170 gms.)
Liq. ammonia	2½ ozs. (70 c.c.s.)
—880	
Water to make...	32 ozs. (900 c.c.s.)

The plates develop and fix in one minute and are then simply rinsed in water.

FIXING, WASHING & DRYING.

Hypo Fixing Bath.

The average strength of hypo for fixing negatives is 4 ozs. per 20 ozs. It should not be less, but may be more—5, 6 or 8 ozs.

A convenient method of keeping hypo is: dissolve each pound in about 20 ozs. of water (hot), cool and make up to 32 ozs. in all. Every 2 ozs. of this stock solution equals 1 oz. hypo. It is used as follows to make up baths of various strengths:—

Col. 1.

8 ozs. ...	Stock, 4; water, 1.
6 ozs. ...	Stock, 3; water, 2.
5 ozs. ...	Equal parts.
4 ozs. ...	Stock, 2; water, 3.
3 ozs. ...	Stock, 3; water, 7.
2 ozs. ...	Stock, 1; water, 4.

To make fixer containing (per 20 ozs.) any of the quantities of hypo named in Col. 1, mix the stock solution with water in the proportion stated on right, *e.g.*, for a fixer of 4 ozs. hypo, mix 2 parts of stock with 3 parts of water.

In fixing plates or films, three rules should invariably be observed:—

1. Let plates remain in fixer as long again as it takes for the white emulsion to dissolve away.

2. Always rinse fingers under tap or in a dish of water after touching hypo, not simply wipe on a towel.

3. Avoid letting hypo droppings dry up on table or floor. If hypo solution drops or is splashed or spilt, mop it up and leave all clean.

Acid Fixing Baths.

Hypo ...	4 to 6 ozs. (200 to 300 gms.)
Potass. metabisulphite ...	$\frac{1}{2}$ oz. (25 gms.)
Water, to make	20 ozs. (1,000 c.c.s.)

The metabisulphite should be added only when the hypo solution is cool or tepid—not when it is hot.

This is the best formula we know for an acid fixing bath for plates or papers. It keeps clear and stainless to the last, and does not throw down sulphur with use.

Extra Rapid Fixing.

Hypo ...	4 ozs. (200 gms.)
Ammonium chloride ...	$\frac{1}{2}$ to 1 oz. (25 to 50 gms.)
Water, to make	20 ozs. (1,000 c.c.s.)

The ammonium chloride is the commercial sal ammoniac as used for batteries. The bath fixes in about half the usual time but is not recommended for regular use.

Hardening-Fixing.

A. Hypo ...	5 ozs. (250 gms.)
Water, to make	20 ozs. (1,000 c.c.s.)
B. Soda sulphite, cryst. ...	4 ozs. (200 gms.)
Acetic acid glacial ...	3 ozs. (fl.) (150 c.c.s.)
Alum ...	2 ozs. (100 gms.)
Water (warm), to make ...	20 ozs. (1,000 c.c.s.)

To make the fixing-hardening bath, 2 ozs. of the B (hardener-solution) are added to 20 ozs. of the A (hypo) solution.

Hypo	...	...	4 ozs.
			(200 gms.)
Potass. metabi-			60 grs.
sulphite	...		(6.5 gms.)
Water, to make			10 ozs.
			(500 c.c.s.)

To this add :—

Chrome alum	...	...	240 grs.
			(25 gms.)
Water	...	...	10 ozs.
			(500 c.c.s.)

Hypo	...	...	1 lb. 6 ozs.
			(275 gms.)
Sodium acetate	2	...	ozs. 45 grs.
			(26.5 gms.)
Chrome alum	...	...	280 grains
			(8 gms.)
Water, to make			80 ozs.
			(1,000 c.c.s.)

Dissolve hypo in 65 ozs. or 70 ozs. of water, and add the sodium acetate. When this is in solution, add the chrome alum previously dissolved in the balance of the water. Excellent for use in hot weather, and will keep a long time without depositing sulphur.

In compounding all hardening-fixing baths, alum should be dissolved by itself in water; the sulphite likewise, and any acid added to the sulphite, the alum solution being then added to the acid-sulphite solution, and the whole mixture thus formed finally added to the hypo.

For Extra Hardening.

For use at temperatures up to 95° F. (35° C.), the following fixing bath may be used. It is well to make it up fresh each week.

Hypo	...	...	5 ozs.
			(250 gms.)
Soda sulphite,			1 oz.
dry	...	...	(50 gms.)

Formaline	...	...	2½ ozs. (fl.)
			(125 c.c.s.)
Water, to make			20 ozs. -
			(1,000 c.c.s.)

Dissolve the hypo first, then the sulphite, and then add the formaline.

Hypo-Eliminator.

Wash the negative for one minute under the tap, and transfer to a shallow dish containing water with enough potass. permanganate in it to turn it pink.

Remove the negative as soon as the colour goes (which will be in a second or two if hypo is present), and keep on treating in the very weak permanganate baths until the colour is not discharged.

The water itself will destroy the permanganate colour, but not quickly as hypo does.

The above is a satisfactory process which allows of a negative being ready for drying within three minutes of fixation

Rapid Drying.

Method I.—Rinse from the hypo-bath, place in 1 : 50 formaline for ten minutes, wash by pouring nearly boiling water six times over the negative and dry by heat. To get rid of the relief which is produced by this process, the negative is rubbed with a piece of wash-leather moistened with alcohol.

Method II.—Soak in two successive baths of methylated spirit, and place in a current of air. Ordinary commercial spirit, owing to the mineral naphtha in it, causes a whitish scum on the surface of the film, and is not favourable to clean work.

HARDENING AND CLEARING.

Hardening Baths.

1. Formaline ... 1 oz. fluid.
(50 c.c.s.)
Water, to ... 10 to 20 ozs.
(500-1,000 c.c.s.)
2. Alum ... 1 oz.
(50 gms.)
Water, to ... 20 ozs.
(1,000 c.c.s.)
3. Chrome alum ... 1 oz.
(50 gms.)
Water, to ... 20 ozs.
(1,000 c.c.s.)

Whichever bath is used, allow it to act for 15 or 20 minutes.

In making up the chrome alum bath, use cold or warm, not hot water.

Clearing Solutions.

ACID ALUM.

- | | | |
|-----------------|-----|-------------------|
| Alum ... | ... | 1 oz. |
| | | (50 gms.) |
| Citric acid ... | | $\frac{1}{2}$ oz. |
| | | (25 gms.) |
| Water, to | | 20 ozs. |
| | | (1,000 c.c.s.) |

Wash well after fixing, and immerse the negative in the above. This bath is also useful for removing white scum from negatives developed with ferrous oxalate if rubbed on with cotton wool.

CHROME ALUM.

1. Chrome alum $\frac{1}{2}$ oz.
(25 gms.)
Hydrochloric acid $\frac{1}{2}$ oz.
(25 c.c.s.)
Water, to ... 20 ozs.
(1,000 c.c.s.)
2. Citric acid ... 1 oz.
(50 gms.)
Water, to ... 20 ozs.
(1,000 c.c.s.)

We prefer bath No. 2 for obtaining a clean smooth film.

Stain Removers.

ALUM-IRON.

The following solution acts on the yellowish stain in a pyro-developed negative, and yields a negative of much quicker printing quality. The solution is slow in action, requiring about 20 minutes.

- | | | |
|------------------|-----|----------------|
| Alum ... | ... | 1 oz. |
| | | (50 gms.) |
| Ferrous sulphate | | 3 ozs. |
| | | (150 gms.) |
| Citric acid ... | | 1 oz. |
| | | (50 gms.) |
| Water, to | | 20 ozs. |
| | | (1,000 c.c.s.) |

In place of the citric acid half a dram of strong sulphuric acid can be used.

THIOCARBAMIDE.

- | | | |
|-----------------|--|----------------|
| Thiocarbamide | | 90 grs. |
| | | (10 gms.) |
| Citric acid ... | | 90 grs. |
| | | (10 gms.) |
| Water, to | | 20 ozs. |
| | | (1,000 c.c.s.) |

SODIUM HYPOCHLORITE.

(Eau de Javelle.)

This bath need only be resorted to in cases of severe stain, particularly on old negatives.

- | | | |
|--------------------------|--|--------------------|
| Bleaching powder | | 1 oz. |
| | | (30 gms.) |
| Sodium carbonate, cryst. | | $1\frac{1}{2}$ oz. |
| | | (45 gms.) |

Shake up the bleaching powder with a solution of the carbonate in a little water (6 ozs. or 180 c.c.s.), and filter. Stir up the residue with plain water, and again filter. The filtrate (solution of sodium hypochlorite) forms an active stain remover.

It can be acidified with oxalic acid, and then discharges yellow stain still more vigorously, but with risk to the silver image.

N.B.—In either state (alkaline or acid) the solution has a strong softening action on gelatine. Plates should not be left to soak longer than necessary—which should be 10 to 15 minutes as a rule.

BLEACH AND RE-DEVELOPER.

(Ilford Formula.)

For negatives which are very heavily stained by developer the following method of the Ilford Co. is often the only one which will entirely remove the stain. The negative is treated in a solution which simultaneously removes the stain and bleaches the silver image. This solution is:—

Potassium per-	50 grs.
manganate	(5.7 grms.)
Common salt ...	$\frac{1}{4}$ oz.
	(12.5 grms.)
Acetic acid	1 oz.
(glacial)	(50 grms.)
Water, to ...	20 ozs.
	(1,000 c.c.s.)

If the negative is one freshly made, it is as well to pass it through a weak bath of chrome alum (about 50 grains in 10 ounces of water, *i.e.*, 10 grms. per litre) before applying the bleacher.

The bleacher is allowed to act for ten minutes, rocking all the time. It cannot harm the gradations of the negative, and this full time makes sure of the removal of the stain, and avoids a repetition of the process. After a brief rinse, the negative is left in a solution of potass metabisulphite (1 ounce in

20 ounces of water) until white everywhere to the back of the film, and is then re-developed in any non-staining developer.

Silver Stains.

Most silver stains (due to dampness of paper or negative while the two are in contact) will readily yield to the following simple treatment first suggested by Mr. Harold Baker:—

Rub the dry negative with Globe metal polish (or other similar abrading preparation) for a minute or two. This is done by applying the polishing paste on a tuft of cotton wool. Then place negative in very strong hypo solution. Here the stain disappears; the time may be minutes or hours according to the depth and age of the stain.

In very severe cases the following method may be necessary:—

Soak the negative in:—

A. Potass. iodide	200 grs.
	(45 grms.)
Water ...	10 ozs.
	(1,000 c.c.s.)

and after washing transfer to—

B. Potass. cyanide	300 grs.
	(70 grms.)
Water ...	10 ozs.
	(1,000 c.c.s.)

in which rub the stained part of the film with a pledget of cotton wool.

If the stain does not yield to this treatment a solution of iodine (in potass. iodide) may be used in place of solution A, but it must be handled with very great care, since the iodine acts more powerfully and it is not at all an easy matter to remove the silver stain without affecting the silver image.

NEGATIVE INTENSIFIERS.

Which to Use.

Negatives which are too thin (and as a rule yield flat prints) may be greatly improved by intensification.

If the negative is thin through under-exposure, that is, has not attained good density even on long development, the best intensifier is the uranium. For this, as for most intensifiers, the plate should be both thoroughly fixed and washed—one is as important as the other.

If the plate is simply under-developed—clear and bright, but thin—the chromium or the mercury and ammonia intensifier (applied more than once if necessary) or the Wellington silver intensifier is very suitable.

If the plate is over-exposed, thin but veiled and flat, the mercury and ammonia intensifier is a good remedy; or it may be well first to reduce carefully with Farmer's reducer, and then (after a second thorough wash) to intensify with chromium, mercury and ferrous oxalate, Wellington's, or, if plate is very flat, with Monckhoven's or the mercury and ammonia formula.

The copper and lead intensifiers give great density, and are suited only for negatives of line drawings, etc., in which great general opacity and, at the same time, great clearness of the lines are required.

They are not suitable for ordinary negatives, *e.g.*, landscape or portrait.

Mercury Intensifiers.

The negative is bleached in the following saturated solution of mercury bichloride:—

Mercury bichloride	1 oz.
Hot water	... 16 ozs.
	(1,000 c.c.s.)

After cooling this solution and pouring off from the white feathery crystals thrown down, add—

Hydrochloric acid	30 minims
	(4 c.c.s.)

After *well washing*, the bleached negative is blackened in one or other of the following:—

A. Ammonia	20 drops
(0.880)	... (20 drops)
Water	... 1 oz.
	(30 c.c.s.)

Gives great intensification and good black colour.

B. Soda sulphite, 10 per cent. solution, made slightly acid with citric acid. Very slightly strengthens a negative.

C. An alkaline developer, such as pyro-soda, pyro-ammonia, hydroquinone. Gives about double the intensification of B.

D. Schlippe's salt	200-400 grs.
Water	... (20-40 grs.)
	... 20 ozs.
	(1,000 c.c.s.)

This solution must be made fresh, and gives great intensification.

E. Ferrous oxalate developer, made as directed under "Developers." This process can be repeated as many times as desired, and gives absolutely permanent results; it acts proportionately on the tones in the negative.

Mercuric Iodide.

The Lumière formula of this intensifier is the best of all intensifiers for moderate increase of density and contrast owing to the readiness with which the action can be stopped at any required stage.

- A. Mercuric chloride 175 grs.
(40 gms.)
Water, to make 10 ozs.
(1,000 c.c.s.)
B. Potass. iodide... 1 oz.
(100 gms.)
Water, to make 10 ozs.
(1,000 c.c.s.)

Add the major part of the iodide (B) solution to that of the mercury and stir well. There should remain a considerable red precipitate. Then add the remainder of the iodide solution in small doses until the solution just clears. This forms the stock intensifier.

The solution changes the negative to a brown colour, which on washing in water changes to bright orange, yielding a very great degree of intensification. For still greater intensification and black colour, pass the negative, after washing, through a bath of soda sulphide, a few grains to the ounce.

A cheaper form of this formula can be made up by using only 270 grs. of potass. iodide instead of 1 oz. as directed above. This is added to the mercury solution, forming a muddy red mixture which can be cleared by adding a few drops of hypo solution.

Lumière Formula.

- Water ... 20 ozs.
(1,000 c.c.s.)
Sodium sulphite 4 ozs.
cryst. ... (200 gms.)
Mercuric iodide 90 grs.
(10 gms.)

The sulphite must be dissolved first. The solution keeps well in the dark.

This is a very convenient intensifier, as plates need only be rinsed for a few minutes in water on coming out of the hypo bath to be ready for intensification.

When intensified they are simply washed for a few minutes; the negative is then liable to yellow in time, but if plate is placed for a few minutes in any non-staining developer the results are quite permanent.

If mercuric iodide is not available the following may be used :—

- Mercuric chloride 50 grs.
(6 gms.)
Water, to make 10 ozs.
(500 c.c.s.)

Add 10 per cent. potass. iodide solution until precipitate first formed is redissolved. About $1\frac{1}{2}$ oz. (75 c.c.s.) will be required and when clear add—

- Sodium sulphite,
cryst. ... 4 ozs.
(200 gms.)
Water, to make 20 ozs.
(1,000 c.c.s.)

Monekhoven's.

Gives very great intensification and contrast, especially useful for negatives of line subjects.

- A. Bromide of 10 grs.
potassium ... (23 gms.)
Bichloride of 10 grs.
mercury ... (23 gms.)
Water ... 1 oz.
(1,000 c.c.s.)
B. Pure cyanide of 10 grs.
potass. ... (23 gms.)
Nitrate of silver 10 grs.
(23 gms.)
Water ... 1 oz.
(1,000 c.c.s.)

The silver and cyanide are dissolved in separate lots of water, and the former added to

the latter until a permanent precipitate is produced. The mixture is allowed to stand 15 minutes, and, after filtering, forms Solution B.

Place the negative in A till it is white, then rinse and transfer it to Solution B. If the intensification has been carried too far, it may be reduced by treatment with a weak solution of hyposulphite of soda.

Chromium Intensifier.

An excellent and convenient intensifier for general work. Results, permanent.

The bleaching bath is best made up from the two following stock solutions:—

- A. Potass. bichromate ... 1 oz.
(50 gms.)
Water, to make 20 ozs.
(1,000 c.c.s.)
- B. Hydrochloric acid 1 oz. (fl.)
(100 c.c.s.)
Water, to make 10 ozs.
(1,000 c.c.s.)

The hydrochloric acid is that sold as "commercial pure" of sp. gr. 1.160.

Bleaching Baths.

	No. 1.	No. 2.	No. 3.
A ...	4 ozs.	8 ozs.	8 ozs.
B ...	3 drms.	2 ozs.	8 ozs.
Water	16 ozs.	10 ozs.	4 ozs.

Bleach in No. 1, 2 or 3 mixture, wash until yellow stain is removed and then develop with diamidophenol.

If other developer is used, it may be necessary to expose for a short time to diffused daylight (not sunlight) during development in order to get full density. Excessive exposure before development may make it difficult to obtain density.

No. 1 gives intensification about equal to mercury and ammonia; No. 2, to that of mercury and ferrous oxalate; and No. 3, to that of mercury and sodium sulphite.

The process may be safely applied after fixation if the plate is simply rinsed for a minute or so.

It may be repeated several times if the first application does not give enough density.

The No. 3 formula for the chromium intensifier, namely, that giving the least intensification, is a very useful means of improving bromide prints which are a trifle weak and particularly which are of poor colour. The re-developed black image is usually a finer black than can be obtained by direct development.

Silver Intensifiers.

ACID SILVER.

- A. Pyro ... 15 grs.
(3.5 gms.)
Citric acid ... 5-10 grs.
(1.2 gms.)
Water, to make 10 ozs.
(1,000 c.c.s.)
- B. Silver nitrate ... 10 grs.
(23 gms.)
Water, to make 1 oz.
(1,000 c.c.s.)

About 1 oz. (30 c.c.s.) of A is poured over the plate once or twice, about 15 drops of B solution added, and the mixture again applied. Intensification now takes place, and the solution is poured off and on until sufficient. If intensifier becomes very thick and turbid, fresh should be mixed up. When dense enough the negative is rinsed, fixed and washed. Negatives (on gelatine plates)

are best hardened with alum or formaline before using this intensifier, otherwise it is difficult to avoid stains.

WELLINGTON'S FORMULA.

First harden the film in:—
Formaline, 1 part; water, 10 parts, for five minutes. Rinse for a few minutes, and then place for *exactly one minute* in:—

Potass. ferricyanide	20 grs. (2.3 grms.)
Potass. bromide	20 grs. (2.3 grms.)
Water, to make	20 ozs. (1,000 c.c.s.)

This causes no apparent change in the negative; if used too long it will bleach the negative and alter its gradation. Rinse again for a few minutes and intensify.

Stock Solutions.

A. Silver nitrate ...	800 grs. (91.2 grms.)
Water (distilled), to make	20 ozs. (1,000 c.c.s.)
B. Amm. sulpho- cyanide	1,400 grs. (160 grms.)
Hypo ...	1,400 grs. (160 grms.)
Water, to make	20 ozs. (1,000 c.c.s.)

Take A, $\frac{1}{2}$ oz., and add slowly to $\frac{1}{2}$ oz. B, stirring vigorously (mixture should be clear); then add 10% pyro solution (prepared with sulphite), 1 dram, and 10% ammonia solution, 2 drams.

Place negative in chemically clean dish, best of glass, and pour solution over it. Silver begins to deposit in a minute or two. When intensified enough, place in acid fixer and well wash. Flat negatives may be over-intensified, and then treated with Farmer's reducer.

Copper Intensifier.

Gives great intensification and is best suited for line subjects.

A. Copper sulphate	100 grs. (230 grms.)
Water, to make	1 oz. (1,000 c.c.s.)
B. Potass. bromide	100 grs. (230 grms.)
Water, to make	1 oz. (1,000 c.c.s.)

A and B are separately made up with hot water, mixed, and allowed to cool. The negative is bleached in the mixture, and washed for a minute or two. It is then blackened in:—

Silver nitrate ...	45 grs. (100 grms.)
Water (distilled), to make	1 oz. (1,000 c.c.s.)

For still greater density the negative is well washed from silver and an ordinary developer applied.

If too dense, after the silver, it can be placed in weak hypo solution (about 10 grs. per oz.) or weak potass. cyanide (about 2 grs. per oz.).

Uranium Intensifier.

A. Uranium ...	100 grs. (23 grms.)
nitrate ...	10 ozs. (1,000 c.c.s.)
Water, to make	10 ozs. (1,000 c.c.s.)
B. Potass. ferri- cyanide	100 grs. (23 grms.)
Water, to make	10 ozs. (1,000 c.c.s.)

The intensifier is prepared from:—A sol., 1 oz.; B sol., 1 oz.; acetic acid, 2 drachms.

The plate must be perfectly free from hypo, and after intensification be washed in several changes of *still* water until the yellow stain is gone. A 10-gr.-per-oz. solution of ammonium sulphocyanide removes

any yellow stain, and weak ammonia or sodium carbonate removes the intensification altogether, restoring the negative to its original state. A weak acetic acid bath should then be applied to the negative if the intensifier is to be again applied.

Lead Intensifier.

The lead intensifier gives very great intensification, and is suited only for line subjects.

Lead nitrate ...	400 grs. (46 grms.)
Potass. ferr- cyanide ...	600 grs. (70 grms.)
Acetic acid ...	3 drachms (20 c.c.s.)
Water, to make	20 ozs. (1,000 c.c.s.)

This stock solution will keep for a long time in the dark. The negative is bleached in it, washed once *very carefully* in 10 per cent. nitric acid—the acid makes the film very tender—then in water, and then darkened in:—

A. Sodium sul- phite ...	1 oz. (50 grms.)
Water, to make	20 ozs. (1,000 c.c.s.)

or in—

B. Schlippe's ...	90 grs. (10 grms.)
salt ...	...
Ammonia ...	6 drachms (40 c.c.s.)
(0.880) ...	...
Water, to make	20 ozs. (1,000 c.c.s.)

or in—

C. Potass. bichromate	1 oz. (100 grms.)
Ammonia ...	$\frac{1}{2}$ oz. (50 c.c.s.)
(0.880) ...	...
Water, to make	10 ozs. (1,000 c.c.s.)

Any of the above darkening solutions gives great intensification.

Callier Formula.

This formula is specially suitable for gelatine plates.

Potassium ferri- cyanide	360 grs. (40 grms.)
Lead nitrate ...	520 grs. (60 grms.)
Acetic acid,	3 drms.
glacial ...	(20 c.c.s.)
Water, to make	20 ozs. (1,000 c.c.s.)

The negative is bleached in the above and then passed through three or four baths of:—Hydrochloric acid, $1\frac{1}{2}$ ozs.; water, 50 ozs., remaining in each for about 5 minutes. Then wash until washings are white and darken in weak solution of ammonium sulphide.

For Weak Negatives.

An intensifier suitable for dealing with ghosts of images is the following, due to M. G. Zelger of the Pathé-Cinema Laboratories. The negative is bleached in a mixture of 2 parts of A and 1 part of B.

A. Copper sul- phate ...	90 grs. (5 grms.)
Acetic acid,	...
glacial	1 oz. 1 dram (28 c.c.s.)

Water, to make 20 ozs.
(500 c.c.s.)

B. Potass. iodide	180 grs. (5 grms.)
Ammonia (22°	$3\frac{1}{2}$ ozs.
Baumé)	(46 c.c.s.)
Water, to make	20 ozs. (250 c.c.s.)

Negative bleaches to a yellowish colour and is then washed for about 20 minutes in running water. It is then darkened with:—Silver nitrate, 22 grs.; sodium acetate, 90 grs.; water, 20 ozs. To avoid stain, it is well to treat the negative with a solution of alum before using the darkening bath.

NEGATIVE REDUCERS.

Reduction is useful if the negative is so dense (black) that it takes long to print. Also, apart from reducing time of printing, reduction is used to improve the gradation of negatives.

For those which are too hard, usually as the result of under-exposure and too long development, the best reducer is the "proportionate" one of permanganate and persulphate.

For those which, though dense, yield prints which are too flat—this is the result of great over-exposure and long development—the best is Farmer's. Belitski's is similar.

Even when density is not excessive, it is usually well, in the case of flat negatives, to reduce a little in "Farmer's," and then intensify.

The other reducers—Eder's and iodine-cyanide—are used chiefly when it is desired to carry out a little reduction of negatives of good gradation.

Farmer's.

This reducer tends to remove detail in the shadows whilst leaving untouched the dense high-lights. Hence it increases contrast; "brightens up" a negative.

Hypo solution... 5 ozs.
(1:5) (150 c.c.s.)
Potass. ferri-... add as
cyanide ... directed
(10% sol.) below.

The quantity of ferricyanide solution to be added is best judged by the colour of the

mixture, which as a rule should be pale yellow, not orange, and should be used weak rather than strong, since its selective action on the shadows of a negative is then less.

Yellow stain is due usually to the use of an acid fixing bath, or an old fixing bath, instead of clean plain hypo solution. It is not easy to remove.

If the reduction is required as "even" as possible, that is, less pronounced on the shadows of the subject in the negative, use the reducer very weak, viz., largely diluted with water.

When seeking to retain contrast, use a strong reducer, applying it with cotton wool, not too wet with reducer. Very useful for line negatives, where quite clear lines on a dense ground are wanted.

Belitski's.

Potass. ferric 150 grs.
oxalate (10 grms.)
Sodium sulphite, 125 grs.
cryst. (8 grms.)
Water, to make 7 ozs.
(200 c.c.s.)

Dissolve and add:—
Oxalic acid ... 40 to 45 grs.
(2.5 to 3.1 grms.)
and shake until the solution turns green. Then pour off from undissolved crystals and add:—

Hypo ... 1½ oz.
(50 grms.)

This reducer is stainless, and keeps well in the dark. Its action on the shadow detail of the negative is similar to that of Farmer's. It varies

somewhat with the strength of the solution.

Instead of the ferric oxalate the following more easily obtainable chemicals can be used in the formula:—

Ferric chloride ...	100 grs.
cryst. ...	(6.5 grms.)
Potass. oxalate...	190 grs.
	(12.5 grms.)

Proportionate Reducer.

A mixed reducer of permanganate and persulphate, originally suggested by N. C. Deck, is found to act proportionately on the densities of a negative, thus reducing contrast. The following formula is that worked out by Kenneth Huse and Adolph H. Nietz, of the Eastman Research Laboratory, for this purpose.

A. Potass. per-	2.2 grs.
manganate ...	(0.25 gm.)
Sulphuric acid	130 minims
	(15 c.c.s.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

The sulphuric acid is a 10 per cent. solution by volume of the 1.84 strong acid.

B. Ammonium	220 grs.
persulphate...	(25 grms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

These stock solutions keep well separately; they are mixed together at the time of use in the proportion of 1 volume of A to 3 volumes of B to form the working reducer. The time of reduction is from 1 to 3 minutes.

Greater control of the action can be obtained by diluting the working mixture with its own bulk of water. After reduction, the negative should be immersed for 5 minutes in a solution of about 45 grs. potass. metabisulphite in 10

ozs. of water. The negative should then be washed for a short time.

Persulphate.

The persulphate reducer acts first on the heavy high-light densities of the negatives, reducing these without affecting shadow detail. It thus "softens" a hard negative.

Ammonium	... 10 to 20 grs.
persulphate ...	(25 to 45 grms.)
Water ...	... 1 oz.
	(1,000 c.c.s.)

A fresh solution is made at time of use. A drop of sulphuric acid per 2 ozs. makes the action more regular. Persulphate has an unenviable reputation for occasional uncertainty in action. A contributor, Mr. A. H. Hall, recommends the following method of using it as infallible. Dry the negative, wet it well, give it a rinse in hypo-eliminator, wash for a few minutes. Make up fresh persulphate solution in water previously acidulated with a drop or two of sulphuric acid, pour on the reducer and rock the whole time. When the milky deposit begins to appear, note the time and continue for 20-30 seconds, for slight reduction, increasing the time for heavier reduction.

If no action is seen in two minutes, throw the solution away, wash the negative, and repeat. If much reduction is required when the solution appears opalescent, throw it away and pour on fresh.

In the case of a panchromatic negative where clouds are too dense, it is safer to determine the time of reduction beforehand, that is from the appearance of the milky deposit and remove the plate after that

time. More uniform results are obtained than by visual inspection. In all cases the action of the bath is stopped by immersing the plate in a solution of soda sulphite.

Iodine-Cyanide.

A very clean-acting (but intensely poisonous) reducer. Very suitable, when used with the further addition of water, for bromide prints, as it leaves no stain.

Iodine (10% sol.)	30 minims. (6 c.c.s.)
Potass. cyanide	5 minims. (1 c.c.)
solution ...	
Water, to make	1 oz. (100 c.c.s.)

To make the iodine solution mix about 150 grs. potass. iodide with just enough water to dissolve it, add 45 grs. iodine flakes, which will dissolve in a instant on stirring, and add water to make 1 fluid oz.

The cyanide solution is one of 10 per cent. strength.

Permanganate.

Potass. perman-	1 dr.
ganate, sol'n	(10 c.c.s.)
Sulphuric acid ...	5 drs.
solution ...	(50 c.c.s.)
Water, to make	10 ozs. (1,000 c.c.s.)

The permanganate is 5 per cent. solution. The sulphuric acid is a 10 per cent. solution by volume of the 1.84 strong acid.

Applied to a wet negative, gives even reduction. A dry negative receives greater reduction in the high lights, and great softening may be obtained by immersing dry negative quickly in the reducer, washing immediately, drying and re-immersing. Any brown stains are removed with a 10% solution of sodium sulphite containing 2% oxalic acid.

Hypoehlor. and Alum.

Chrome alum ...	10 grs. (4 gms.)
Eau de Javelle ...	$\frac{1}{2}$ oz. (100 c.c.s.)
Water, to make...	5 ozs. (1,000 c.c.s.)

Immerse the negative and gently rub the surface with a piece of cotton wool. By confining friction with the wool to certain parts, extra reduction can be obtained.

For Eau de Javelle, see under *Clearing Solutions*.

Baskett's (Local) Reducer.

Globe metal	
polish ...	2½ d. tin
Terebene ...	2 ozs.
Salad oil ...	2 ozs.

The ingredients are to be well mixed, and strained through fine muslin two or three times to remove any coarse particles. Dense parts of a negative are rubbed down with the reducer applied by the finger-tip or with a bit of chamois leather.

Reducing Hard Negatives.

A most valuable and perfectly safe method of reducing excessively hard negatives is one dependent on re-development. Bleach the negative first in a solution of ferricyanide and ammonium bromide, using the same bath as is commonly employed for sulphide toning.

After a thorough wash re-develop in a developer containing 2 per cent. of Rodinal and 1 per cent. of potassium bromide—that is, one containing 1 dram of Rodinal and 5 drams of 10 per cent. bromide solution in 6 ozs. of water.

Development will be very slow, but the plate may be left

to itself for half an hour or so, as the action cannot go too far. When development is sufficient the plate is fixed, washed and dried.

The advantage of this pro-

cess over reduction with persulphate is the great degree of control. The re-development can be stopped at any desired stage after a little experience in judging the degree of re-development.

NEGATIVE VARNISHES.

How to Varnish.

Using Cold Varnish.

First place negatives where they will become perfectly dry,

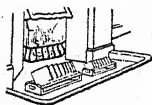


Fig. 1.

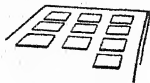


Fig. 2.

e.g., near a fire (fig. 1) or on a bath hot water tank.

Next lay out to get quite cold (fig. 2).

Dust negatives with a strip of cotton plush or camel's hair brush (fig. 3).



Fig. 3.



Fig. 4.

Poise negative on tips of fingers, steady with thumb and pour pool of cold varnish on to centre of the negative (fig. 4). Use plenty of varnish.

Let pool spread of itself (fig. 5).

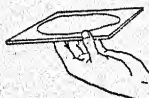


Fig. 5.



Fig. 6.

Now incline plate so as to cause the varnish to flow into

right-hand corner (fig. 6).

Then into the left-hand far corner (fig. 7).

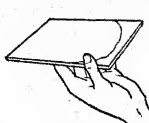


Fig. 7.

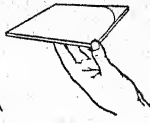


Fig. 8.

Then into the left-hand near corner (fig. 8).

Finally raise the negative so as to let the excess of varnish flow back into the bottle (fig. 9).



Fig. 9.

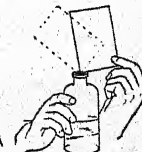


Fig. 10.

In tilting the negative to distribute the varnish, return the plate to the level position *a little before* varnish has reached the corner; the wave of varnish will carry the coating into the corner, and you will avoid getting varnish on the glass side or up your sleeve.

As last drops of varnish run into the bottle, rock negative to and fro (fig. 10), so as to avoid a streaky coating. Then stand the negative on edge on blotting paper to dry.

Cold Varnishes.

Celluloid	... 1 oz.
	(10 gms.)
Amyl acetate	... 50 ozs.
	(500 c.c.s.)

To counteract the sickly odour of amyl acetate, add a small proportion of oil of lavender.

This may be flowed over or applied with a brush to the cold negative.

Zanzibar copal	6 ozs.
	(30 gms.)
Amber (fused)	... 1 oz.
	(5 gms.)
Ether	... 60 ozs.
	(300 c.c.s.)
Acetone	... 40 ozs.
	(200 c.c.s.)
Chloroform	... 4 ozs.
	(20 c.c.s.)
20% shellac solution	2 ozs.
	(160 c.c.s.)
Ammonia (0.880)	... 3 drs.
	(30 c.c.s.)
Methylated spirit	... 4 ozs.
	(320 c.c.s.)

A mixture of Japanese gold size (1 part) and benzole (2 parts) forms a rather slow-drying though otherwise excellent cold varnish. The surface takes the pencil well.

Water Varnish.

Shellac	... 3 ozs.
	(100 gms.)
Sodium carbonate (saturated sol.)	24 ozs.
	(800 c.c.s.)

The shellac is allowed to soak in the liquid for twenty-four hours; the liquor is then poured away and replaced by an equal quantity of water, and the mixture boiled until the shellac dissolves. After standing some time the liquid becomes perfectly clear and bright.

Hot Varnishes.

1. Sandarac	... 1 oz.
	(55 gms.)
Seed lac	... 1½ oz.
	(83 gms.)
Castor oil	... 3 drs.
	(20 c.c.s.)
Oil of lavender	... 1½ dr.
	(10 c.c.s.)
Alcohol	... 18 ozs. (fl.)
	(1,000 c.c.s.)

This varnish is somewhat dark in colour.

2. Best orange shellac	2½ ozs.
	(125 gms.)
Oil of lavender	... ¼ oz.
	(13 c.c.s.)
Methylated alcohol	20 ozs.
	(1,000 c.c.s.)

Instead of oil of lavender, oil of turpentine (pure) can be used.

Keep in a warm place until dissolved; then add a large teaspoonful of whiting or prepared chalk; shake, set aside to clear, and then decant. This is specially recommended for gelatine negatives.

3. White hard varnish	15 ozs.
	(150 c.c.s.)
Rectified spirit	20 to 30 ozs.
	(200 to 300 c.c.s.)

Methylated spirit should not be used. This will be found a good varnish if durability is not required, as it is easily rubbed up for retouching upon and easily cleaned off.

4. Seed lac	... 2 ozs.
	(50 gms.)
Sandarac	... 2 ozs.
	(50 gms.)
Oil of lavender	... ½ oz.
	(12.5 gms.)
Castor oil	... 1 oz.
	(25 c.c.s.)
Alcohol	... 40 ozs.
	(1,000 c.c.s.)

To prepare a good surface for the retouching pencil, the negative after varnishing is dusted

over with fine resin powder and rubbed up with the fingers.

5. Sandarac	... 4 ozs.
	(113 grs.)
Alcohol ...	... 28 ozs.
	(800 c.c.s.)
Oil of lavender...	3 ozs.
	(85 c.c.s.)

This is a good varnish for retouching upon, and a tooth is easily obtained by rubbing.

For Film Negatives.

Water Varnish.

Borax ...	... 300 grs.
	(30 grs.)
Glycerine -	... 300 minims
	(30 c.c.s.)
Shellac ...	... 600 grs.
	(70 grs.)
Water ...	... 20 ozs.
	(1,000 c.c.s.)

Boil together for about half-an-hour, then add—

Methylated spirit	5 ozs.
	(250 c.c.s.)

and filter.

Dammar Varnish.

Dammar ...	1 oz.
	(100 grs.)
Benzole, 90% ...	10 ozs.
	(1,000 c.c.s.)

Filter. Benzole (*viz.*, benzene, not "benzoline") must be of the 90% strength.

Retouching Medium.

Pale gum resin	200 grs.
	(230 grs.)
Gum dammar ...	90 grs.
	(100 grs.)
Gum mastic ...	20 grs.
	(23 grs.)
Oil of juniper ...	1 gr.
	(1 gm.)
Oil of turpentine	2-4 ozs.
	(1,000-2,000 c.c.s.)

The gums are powdered and added to the oils, and finally enough pure asphaltum is added to give the mixture a dark amber colour when viewed through the depth of an inch.

This formula is strongly recommended by Whiting in his "Retouching" as not liable to pick, rub off, or come off on after-varnishing. It takes a great deal of work.

Ground-Glass Varnish.

Sandarac	... 90 grs.
	(103 grs.)
Mastic ...	... 20 grs.
	(23 grs.)
Ether (0.720) ...	2 ozs.
	(1,000 c.c.s.)

Dissolve the resins in the ether and afterwards add—

Benzole	... $\frac{1}{2}$ to $1\frac{1}{2}$ ozs.
	(250-750 c.c.s.)

The proportion of the benzole added determines the nature of the matt obtained.

This varnish must be applied to the cold negative or the coating will not be matt.

Tinted Varnish.

Malachite green, aurantia, or asphaltum is used for tinting the above matt varnish green, yellow, or brown respectively (for handwork on the back of a glass negative).

For the occasions, however, when a tinted matt varnish is required only in small quantity, *e.g.*, for equalising the printing density of a negative, as convenient a means as any is to add a little ordinary iodine (flakes) to the ground glass varnish made in accordance with the above formula.

Spotting Medium.

Indian ink—Water colour chalk.
Payne's grey—Water colour chalk.

Grind together with water only on a palette to match the colour of the negative.

Another spotting medium may be very readily compounded by thinning down ordinary sepia moist water-colour with black writing ink to the consistency of cream.

Blocking-Out Mixtures.

1.—Gamboge and vermilion red, or Payne's grey and vermilion are ground together in water in equal parts with addition of a little gum water if a glossy surface is required.

2.—Commercial "Brunswick black" forms an excellent blocking-out mixture for large work, and is quickly applied with a brush.

3.—When printing on development papers, yellow or orange dye (*e.g.*, Vanguard yellow) is a convenient blocking-out medium which is easier in use owing to its transparency. First go over the film with ox-gall on wet cotton wool; the dye then diffuses slightly beyond the edge of the brush work and avoids harsh lines.

In the case of subjects containing detail such as ladies' hair, or drapery, a weak dye application over the outline will add the necessary density to the background without clogging the hair. Then proceed as usual with a stronger wash, when stray bits not wanted to print can be taken off without leaving a sharp edge.

Titles on Negatives.

The usual method is to have the words forming the title set up in type and photographed on a "process" plate. The subject negative having been made with a clear margin round it, a strip of the title negative is laid down on this



margin by stripping and the clear margin then filled up with "Photopake" or other blocking out mixture except over the strip of title, which is made dense enough, in the first instance, to print white. If a clear portion in a landscape negative cannot be found (in cases where the title has to appear on the view), a piece must be cut out with a sharp knife.

An alternative method, shown in the illustration, is to cut away part of the negative film (round the subject), lay on the title strip and then fill in with opaque except over the title strip.

STRIPPING.

Glass Negatives.

The following process (of Middleton and Holcroft) is a very reliable one for stripping the film from a glass negative and transferring it (with or without reversal) to a second glass plate or other support.

The materials are:—

Stock solution, made by mixing methylated spirit, 25 ozs. (250 c.c.s.); water, 1 oz. (10 c.c.s.); glycerine, 1 oz. (10 c.c.s.).

Some commercial hydrofluoric acid. Must be kept in a gutta percha bottle.

Some waxed paper, made by soaking thin note paper in hot melted paraffin wax for about half an hour.

A bow of thin cane fitted with a waxed silk thread.

Wooden window wedges, weak gum solution and a sharp penknife.



Fig. 1.

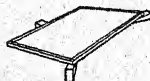


Fig. 2.

Cut through the film all round the negative at a distance of about one-eighth of an inch (3 mm.) from the edge (fig. 1).

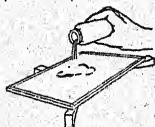


Fig. 3.

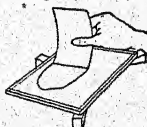


Fig. 4.

Place the negative level on three wooden wedges (fig. 2).

Pour on "stripping solution" made by adding from 6 to 30 drops of hydrofluoric acid to 1 oz. (30 c.c.s.) of the stock solution (fig. 3).

Spread the mixture with an end of paper (fig. 4).



Fig. 5.

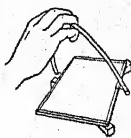


Fig. 6.

After a minute or so try (with the finger) if the edgings of film are loose, and remove them as soon as they come away without any pull whatever (fig. 5).

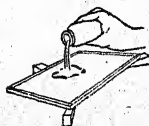


Fig. 7.



Fig. 8.

Now test if the whole film is loose by passing the waxed silk thread underneath (fig. 6).



Fig. 9.



Fig. 10.

If all is free, pour on some plain stock solution (fig. 7), and apply a sheet of waxed paper (fig. 8).

Squeegee down the waxed paper lightly (fig. 9).

Then remove paper and negative film together in contact by slipping the blade of a penknife under the film (fig. 10).

Now apply the paper, with the negative film on its under side, to a glass plate previously coated with very weak gum solution, dried and flowed over with stock solution (fig. 11).



Fig. 11.



Fig. 12.

Then squeegee down (fig. 9) and remove the waxed sheet, using the blade of the penknife to keep the corner of the film to the glass (fig. 12).

If it is desired to reverse the negative (as regards right and left), the film is transferred from the first sheet of waxed paper (fig. 10) to a second sheet of the same material. Sheet No. 1 is then pulled off and the negative film applied to a glass plate prepared with gum, etc., as already described.

FOR OLD NEGATIVES.

A less rapid solution, but one which will be safe in the case of an old or hardened negative, is:—

Methylated spirit 1 oz.
Water ... 2 ozs.
Hydrofluoric acid 60 mins.

These proportions may be slightly altered for different commercial spirits and acids.

It is better to use this formula for negatives which may have become hard or horny with age.

Dry Stripping.

A useful and speedy method of stripping the film off glass plates in a dry condition for carbon printing, etc., is the following:—The negative is thoroughly well washed after fixing.

Then immerse for five minutes in a solution of potassium carbonate (9 ozs. potass. carbonate in 8 ozs. of water). Remove from the solution and blot off surplus moisture with a soft cloth, rub dry with another cloth, and then cut through the film with a penknife at the top edge.

When thoroughly dry, *i.e.*, in about 10 minutes, insert a needle under the film at the top corner and pull steadily, when the film will be found to leave the glass with perfect ease and certainty. This method appears to have no deleterious effect on the film at all.

Sterry Process.

The following is also for stripping films from glass negatives, especially when the negatives are to be permanently kept in the film form.

The negatives are immersed for thirty minutes in:—

Potass. carbonate	2 ozs.
saturated solution	
Glycerine	... 1 oz.
Formaline	... 1 oz.
Tap water	... 50 ozs.

This mixture is cloudy soon after making, and must be either filtered or decanted from the sediment. The plates, after immersion, are stood to drain for a few moments, and the solution mopped off them with an old soft handkerchief made into a pad. They are then put aside, where they will dry slowly

and uniformly, requiring, as a rule, at least six hours, and better twelve or more.

To strip them, all that is then necessary is to cut round with a sharp knife about $\frac{1}{8}$ th in. from the edge of the plate, when, on lifting one corner, the film will separate easily, and lie perfectly flat. Longer immersion in the mixture or more formaline added causes the edges of the films to separate and curl up.

A greater proportion of formaline so hardens the film that it splits on drying. Artificial heat makes the stripping irregular, or the film may refuse to leave the glass. The remedy is to allow the plates to stand where they can absorb moisture before stripping.

The process is of no use for stripping negatives on celluloid film.

Film Negatives.

In the case of negatives on celluloid cut or roll-film the following is a suitable method :—

Caustic soda	... 10 grs.
	(23 grms.)
Formaline	... 10 minims
	(20 c.c.s.)
Water	... 1 oz.
	(1,000 c.c.s.)

The celluloid negative is immersed in this solution until the film shows signs of detachment, and can be rolled back with the finger. It is then placed in—

Hydrochloric acid	25 minims
	(50 c.c.s.)
Glycerine	... 25 minims
	(50 c.c.s.)
Water	... 1 oz.
	(1,000 c.c.s.)

in which it is removed from its original support to a glass or other base.

Wet-Collodion Negatives.

When the negative is thoroughly dry and cool, flow over with thin solution of rubber in benzole. 2 parts pure rubber to 100 parts benzole, or ordinary cycle tyre repairing solution thinned down to about the consistency of collodion will do.

When this is dry, the negative is flowed over with "leather" collodion. This is prepared by adding a small quantity of castor oil to plain collodion. A good formula is as follows :—

Celloidin	... $\frac{1}{2}$ oz.
	(5 grms.)
Ether	... 5 ozs.
	(50 c.c.s.)
Alcohol	... 5 ozs.
	(50 c.c.s.)
Castor oil	... $\frac{1}{2}$ oz.
	(5 c.c.s.)

When the collodion on the negative is dry (the drying can be hastened by heat), the negative is cut round the edges with a knife, and placed in a dish of cold water. The film should soon begin to loosen at the edges; if it does not, a little acetic acid (up to 10 per cent.) may be added to the water.

The film is now transferred to a piece of paper, and thence to the new support. If the negative is to be reversed it is transferred to another piece of paper before being placed on its final support.

PLAIN AND ALBUMEN PAPERS.

The following are formulæ for "salting" and sensitising papers such as Whatman's drawing papers.

Formulæ such as these, which were largely used in the days before the industrial manufacture of printing papers, yield sensitive coatings which keep in good condition only for a few days. Moreover, they require a negative of very considerable vigour; a negative which prints well in P.O.P. is not nearly vigorous enough. In addition to this, it is necessary to over-print to an appreciable extent, since prints lose depth in the toning and fixing baths. Despite these drawbacks, the formulæ are deserving of more notice than they now receive, especially for the sensitising of fabrics such as silk, satin, cotton.

First prepare the plain paper with—

Ammonium chloride	...	60-80 grs. (14-18 grms.)
Sodium citrate	...	100 grs. (23 grms.)
Sodium chloride	...	20-30 grs. (4.5-7 grms.)
Gelatine...	...	10 grs. (2 grms.)
Distilled water	...	10 ozs. (1,000 c.c.s.)

or—

Ammonium chloride	...	100 grs. (23 grms.)
Gelatine...	...	10 grs. (2 grms.)
Water	...	10 ozs. (1,000 c.c.s.)

The gelatine is first swelled in cold water and then dissolved in hot water, and the remaining components of the formula are

added. The solution is filtered, and, when still warm, the paper floated upon it for three minutes and dried.

The salted paper is sensitised upon a neutral 45-grain silver bath.

PLATINUM TONING BATH.

Potass. chloro-	...	4½ grs. (1 gm.)
platinite	...	10 ozs. (1,000 c.c.s.)
Water	...	2-3 drops (5-10 drops)

Albumen Paper.

Albumenised paper (now very little used) is sensitised on the following silver solution:—

Silver nitrate	...	600 grs. (140 grms.)
Distilled water	...	10 ozs. (1,000 c.c.s.)

The bath is made just acid with nitric acid, requiring three or four drops per 10 ozs.

TONING BATH.

Gold chloride	...	15 grs. (1 gm.)
Water	...	4 ozs. (120 c.c.s.)

Add lime water until a piece of red litmus paper, placed in the solution, is turned blue. Then add—

Calcium chloride,	120 grs.
fused	...
Water to make...	7½ ozs. (115 c.c.s.)

This solution is diluted with 15 times its volume of water to make the toning bath; it can be used over and over again by addition of stock solution.

SELF-TONING PAPERS.

Self-toning papers are made with both collodion and gelatine emulsions; those with the former constitute the larger number of the brands on the market. Generally speaking the gelatine papers yield a greater variety of tones according to the strength of the hypo fixing bath, and the time of immersion of the print. On the other hand the collodion papers exhibit greater certainty in the tone which they yield by simple fixation in hypo.

Printing.

The paper should be exposed under the negative until the picture is considerably darker than the finished print is required to be. With many papers the printing should be continued until the shadows of the picture show a species of metallic bronze, while at the same time the lightest parts of the subject, usually the sky, are quite perceptibly darker than the unexposed paper.

The more rapidly the paper is printed the greater the degree of over-printing which is necessary; prints which require a very long exposure, owing to the great density of the negative or the weakness of the light, need very little over-printing.

Washing.

Although some makers do not advise it, it is better to wash prints before toning, since this conduces to greater permanency of the results. Prints are washed

in running water or in four or five changes of clean water, keeping them on the move.

Collodion prints are very liable to curl up in the wash water to an awkward extent. This can be avoided by placing them in the first instance in very little water—only enough to cover one or two prints. Several prints are laid face down in this water one after the other, placing each one in as soon as the preceding one has been wetted all over, and before it has had time to curl. The upper prints thus keep those below them fairly flat, and the prints show much less curl during the further washing, etc., in a greater depth of water or fixing solution.

Fixing-Toning.

The prints are fixed and at the same time toned to a rich sepia colour by immersion in a plain solution of hypo. The makers' instructions should be followed. A very usual strength is:

Hypo	...	...	4 ozs.
			(100 gms.)
Water	...	...	20 ozs.
			(500 c.c.s.)

With some papers it is an advantage to add a pinch or two of bicarbonate of soda to the fixing bath. This is especially so in the case of papers which it is directed should not be washed before fixing.

Purple Tones.

In place of the first washing in water, prints are soaked for about 5 minutes in:—

Commonsalt ...	2 ozs.
	(50 gms.)
Water ...	20 ozs.
	(500 c.c.s.)

They are then washed in two changes of water and then fixed as directed above.

Two-Colour Prints.

Very pleasing colour effects can be obtained by painting

parts of the dry print with the above salt solution, using a camel hair brush. On then fixing the whole print in the ordinary way, the parts which have been treated with the salt will tone to a purple, whilst the untreated parts will come out a warm brown. Especially with portraits, this process yields some very pleasing results.

GELATINE P.O.P.

Emulsion.

Gelatine...	175 grs.
	(80 gms.)
Ammonium ...	18 grs.
chloride	(8 gms.)
Rochelle salts ...	50 grs.
	(23 gms.)
Silver nitrate ...	75 grs.
	(34 gms.)
Alcohol ...	4 drs.
	(100 c.c.s.)
Water ...	5 ozs.
	(1,000 c.c.s.)

The gelatine in the formula is a mixture of equal parts of Nelson's No. 1 and Coignet's.

Heat to 100° F. (38° C.) and allow to remain at this temperature after all is dissolved for ten minutes, after which proceed in the usual way.

P.O.P. Procedure.

Wash prints in several changes of water until wash water ceases to show milkiness when poured into clean glass measure (time, 10 to 15 minutes). Tone in gold bath (5 to 10 minutes). Again wash as thoroughly as before toning. Fix in:—Hypo, 2 to 3 ozs.; water, 20 ozs., for 10 minutes. Finally wash in running water or frequent changes (every 5 or 10 minutes) for 1 to 2 hours.

Prints can be toned in a

platinum bath instead of in one of gold (see formula below). The other manipulations remain the same as above. Platinum tones are best suited to matt surface paper.

Prints can be toned and fixed at the same time in a "combined" bath (see formula below). With some baths and papers it is best to wash before toning; with others it is not necessary. The tones by the "combined" method are almost always warmer than by separate toning and fixing. Also they are somewhat inferior in permanence.

Gold Toning Bath.

The following is the best and most generally used toning bath for P.O.P., and yields fine purplish tones.

Gold chloride ...	2½ grs.
	(0.3 gm.)
Ammonium ...	30 grs.
sulphocyanide	(3.5 gms.)
Water ...	20 ozs.
	(1,000 c.c.s.)

It is necessary for this and all sulphocyanide baths to ripen. The best method of mixing is to boil the water and to dissolve the gold in one half and the sulphocyanide in the other—

both scalding hot. Then pour the gold into the sulphocyanide in small doses, stirring all the time; use when cool. If cold water is used, the mixture should be allowed to stand 12 hours.

STOP FOR GOLD TONING.

A weak solution of soda sulphite (5 grs. per oz.) at once stops the action of a gold toning bath.

SALT BATH.

A short immersion of prints in the following bath prior to the first washing favours even toning and prevents spots and stains from rusty tap water:—

Salt	2 ozs.
	(100 grms.)
Sodium carbon-	1 oz.
ate, cryst ...	(50 grms.)
Water	20 ozs.
	(1,000 c.c.s.)

If prints are to be toned in the platinum bath the carbonate should be omitted.

Combined Baths.

ALKALINE TONE-FIXING BATH.

Gold chloride ...	2 grs.
	(0.23 gm.)
Lead nitrate ...	10 grs.
	(1.2 gm.)
Chalk	$\frac{1}{2}$ oz.
	(25 grms.)
Hypo	4 ozs.
	(200 grms.)
Water to make...	20 ozs.
	(1,000 c.c.s.)

Shake the solution well, allow to settle, and use the clear portion. If prints tone too quickly, under 10 minutes, in the combined bath it is best to pass them afterwards through a plain fixing bath of: hypo, 3 ozs.; water, 20 ozs. This ensures prints receiving ample fixation, which otherwise they might not get whilst in the combined toning and fixing bath.

VALENTA'S.

Hypo	8 ozs.
	(400 grms.)
Ammonium sul-	1 oz.
phocyanide ...	(50 grms.)
Lead nitrate ...	175 grs.
	(20 grms.)
Alum	350 grs.
	(40 grms.)
Water, to make...	20 ozs.
	(1,000 c.c.s.)

Dissolve the hypo in the water, add the sulphocyanide, then add the alum dissolved in a little water, and also the lead, and add to the hypo. Heat the mixture to 120 deg. F. for ten minutes; allow to cool. For use take—

Stock solution ...	10 ozs.
(as above)	(100 c.c.s.)
Water	10 ozs.
	(100 c.c.s.)
Gold chloride ...	$3\frac{1}{2}$ grs.
(from stock sol.)	(0.08 gm.)

Reducer for Dark P.O.P.'s.

The best reducer for over-printed P.O.P.'s is one made up at the time of use from 10 per cent. stock solutions of (A) ammonium sulphocyanide and (B) potass. ferricyanide. The reducing solution consists of:—

A solution ...	5 ozs.
	(10 c.c.s.)
B solution ...	$\frac{1}{2}$ oz.
	(1 c.c.)
Water, to make...	24 ozs.
	(50 c.c.s.)

This is used on the prints after toning, fixing and well washing out the hypo in the usual way.

This reducer acts perfectly on P.O.P. prints, even after gold toning. If anything, it improves the tone of the print by rendering it somewhat cooler.

Platinum Toning.**PHOSPHORIC ACID.**

Potass. chloro-	4 grs.
platinite	(0.45 gm.)
Phosphoric acid	$\frac{3}{4}$ oz. (fl.)
(sp. gr. 1.12)	(35 c.c.s.)
Water, to make...	20 ozs.
	(1,000 c.c.s.)

CITRIC ACID.

Potass. chloro-	4 grs.
platinite	(0.45 gm.)
Sodium chloride	40 grs.
(salt)	(4.5 gms.)
Citric acid	50 grs.
	(5.8 gms.)
Water, to make...	20 ozs.
	(1,000 c.c.s.)

HADDON'S FORMULA.

Platinum per-	3 grs.
chloride	(0.2 gm.)
Sodium formate	100 grs.
	(6.5 gms.)
Formic acid ...	30 minims
	(1.8 c.c.)
Water, to make...	35 ozs.
	(1,000 c.c.s.)

STOP FOR PLATINUM TONING.

A weak solution of sodium carbonate (10 grs. per oz.) instantly arrests the toning action of a platinum bath.

Developing P.O.P.**PAGET BROMIDE PROCESS.**

The prints are immersed in 10 per cent. potass. bromide solution for five or ten minutes, washed and developed with the following:—

A. Hydroquinone	40 grs.
	(4.5 gms.)
Sodium sul-	160 grs.
phite ...	(18 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)
B. Potass. bro-	2 $\frac{1}{2}$ ozs.
midide ...	(125 gms.)

Sodium car-	2 ozs.
bonate	(100 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

C. Potass. cyanide	$\frac{1}{2}$ oz.
	(25 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

For average negatives, mix:—
A, $\frac{1}{2}$ oz.; B, 1 oz.; C, 20 minims;
water, $\frac{1}{2}$ oz.

For flat negatives (greater contrast), A, 3 drs.; B, 1 oz.; water, 5 drs.

For hard negatives (soft results), A, 7 drs.; B, 1 oz.; water, 1 dr.

The cyanide solution is used as above in quantity sufficient to keep the backs of prints clean.

ACID DEVELOPER.

A stock solution is made of:—

Pyro ...	60 grs.
	(24 gms.)
Metol ...	60 grs.
	(24 gms.)
Acetic acid ...	1 $\frac{1}{2}$ drs.
	(30 c.c.s.)
Water, to make...	6 ozs.
	(1,000 c.c.s.)

The working developer is made by mixing $\frac{1}{2}$ oz. of this stock solution with 16 ozs. of water at the time of use.

The developer should be used in a perfectly clean glass dish and kept moving over the print until the required depth is reached. This usually takes from 1 to 2 minutes. Plenty of the developer should be used, and it should be discarded as soon as it becomes turbid or muddy.

Without rinsing, the prints should be transferred to a fixing bath composed of:—

Hypo ...	2 ozs.
	(200 gms.)
Soda sulphite ...	$\frac{1}{2}$ oz.
	(50 gms.)
Water, to make...	20 ozs.
	(2,000 c.c.s.)

BROMIDE AND GASLIGHT PAPERS.

Amidol Developer.

Soda sulphite	650 grs.
cryst.	(74 gms.)
Potass. bromide	10 grs.
	(1.2 gm.)
Water, to make...	20 ozs.
	(1,000 c.c.s.)
When dissolved, add—	
Amidol ...	50 grs.
	(5.7 gms.)

This developer will not keep more than three days.

The most convenient method of making amidol developer for bromide papers is to make up a 10 per cent. solution of sodium sulphite, and add 5 grs. potassium bromide to each 10 ozs. solution. For use add 4 grs. dry amidol to each ounce of solution, and dilute with an equal bulk of water. For best colour of prints, the sulphite solution should be made fresh each day.

Metol-Hydroquinone.

A. Metol ...	32 grs.
	(3.6 gms.)
Hydroquinone	120 grs.
	(13.7 gms.)
Alcohol ...	2 ozs.
	(100 c.c.s.)
Mix and shake well but will not all dissolve.	
B. Soda sulphite,	3 ozs.
cryst.	(150 gms.)
Soda carbonate,	3 ozs.
crystals	(150 gms.)
Potass. bromide	8 grs.
	(1 gm.)
Water, about...	10 ozs.
	(500 c.c.s.)

Heat water to about 130° F. and add soda sulphite. Continue heating to nearly boiling point, meantime adding soda

carbonate. When all is dissolved, pour hot solution B. into solution A. and add the potass. bromide. Then add water to make 20 ozs. (1,000 c.c.s.).

For bromide papers, use one part stock to three parts water. For gaslight papers, one part stock to one part water. This developer gives excellent results with practically all makes of bromide and gaslight papers. It keeps for at least 18 months when stored in well-corked bottles filled to the neck, and has been found to retain its properties, as regards the colour and vigour of developed prints, for twice this period.

Chlorquinol.

(For Chloro-bromide Papers.)

Soda sulphite	$\frac{1}{2}$ oz.
cryst.	(25 gms.)
Soda carbonate	$\frac{1}{2}$ oz.
cryst.	(25 gms.)
Potass bromide...	5 grs.
	(0.5 gm.)
Chlorquinol ...	60 grs.
	(6.8 gms.)
Water ...	20 ozs.
	(1,000 c.c.s.)

Time of development, 2 to 3 minutes at 65° F. For warmer tones, dilute with an equal bulk of water, and increase the exposure.

Reducers for Bromides.

OVER-DEVELOPED PRINTS.

Over-developed prints are best treated in a *weak* iodine-cyanide reducer made from (A) 10% solution of iodine in potass. iodide and (B) 10% potass. cyanide solution.

Take:—

A solution	...	30 minims (2 c.c.s.)
B solution	...	10 minims (0.6 c.c.)
Water	...	2 ounces (60 c.c.s.)

adding more of A and B solutions if necessary.

For making the iodine solution see under "Negative Reducers" earlier in this section.

OVER-EXPOSED PRINTS.

Harden the print well, wash and dry. Re-soak in water till limp and apply a reducer made from the following two stock solutions:—

A. Potass. perman- ganate	1 gr (0.05 gm.)
Water, to make	1 dm. (3 c.c.s.)
B. Common table salt	40 grs. (2.8 gms.)
Sulphuric acid	10 minims (0.5 c.c.s.)
Water, to make	10 ozs. (250 c.c.s.)

Immediately before use, mix A solution 1 drm. (3 c.c.s.), B solution 10 ozs. (250 c.c.s.), and dilute, if necessary, to slow the action conveniently.

When sufficiently reduced, the print is thoroughly rinsed, and fixed for 10 mins. in a 10 per cent. fixing bath, preferably one of the acid kind, *e.g.*, hypo. plus potass. metabisulphite.

Any residual brownish permanganate stain is removed from the well washed print by the following bath:—

Hydrochloric acid, 200 minims (20 c.c.s.); Common salt, 25 grs. (2.8 gms.); Soda sulphite (anhydrous) 25 grs. (2.8 gms.); Water to make 20 ozs. (1,000 c.c.s.). A final wash completes the treatment.

Clearing Bath.

To remove yellow stain from bromide prints, the following is a suitable solution:—

Alum (satur- ated solution)	10 ozs. (1,000 c.c.s.)
Hydrochloric acid	3 drs. (40 c.c.s.)

Prints from Flat Negatives.

Prints of good contrast can be made as follows: The paper is fully exposed and over-developed, fixed and washed. The prints are then placed in the following iodine bath until whites are strongly blue, and then fixed for five minutes.

IODINE BATH.

Potass. iodide	...	30 grs. (7 gms.)
Iodine	...	3 grs. (0.7 gm.)
Water, to make		10 ozs. (1,000 c.c.s.)

If not sufficiently lightened, the print may be washed and the process with bleaching bath and hypo repeated.

Stress Marks on Bromides.

Avoid rubbing paper against other sheets in boxes or packet and against negative or mask. In cutting up large sheets, use shears on open sheet, not knife, etc., which rubs on emulsion surface. Have developer water-clear, free from sediment and any floating dirt. Use plenty of developer.

Addition of from 40 to 60 minims of 10 per cent. solution of potass. cyanide to each 10 ozs. of developer will avoid stress marks in many cases, or a developer may be made up according to the formula:—

Soda sulphite	1 oz.
cryst.	(50 gms.)
Potass. bromide	2 grs.
	(0.23 gm.)
Amidol ...	35 grs.
	(4.0 gms.)
Potass. cyanide...	2 grs.
	(0.23 gm.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

If stress marks occur, they can usually be removed by gently rubbing each print with a soft rag as soon as it has had a minute or so in the wash-water. A further aid to removal is a solution of borax, $\frac{1}{2}$ oz.; water, 20 ozs.; methylated spirit, 5 ozs., rubbed over with soft rag or cotton wool.

Sulphide Toning.

Of the many methods of producing sepia to warm brown tones on bromide or gaslight the following is the best and most reliable. The prints are bleached in a bath of ferricyanide and bromide, briefly washed and darkened or toned in a solution of soda sulphide. Prints require to be well washed from hypo before being put into the bleacher. In summer, or in places where the water supply has a softening action on prints, it is well to fix them in a fixing hardening bath. (See "Fixing.")

BLEACHER.

Ammonium	100 grs.
bromide	(11 gms.)
Potass. ferri-	300 grs.
cyanide	(35 gms.)
Water, to make	20 ozs.
	(1,000 c.c.s.)

SULPHIDE BATH.

It is best to keep the soda sulphide in strong 20 per cent. solution; a weak solution does not keep well. Use the pure

white sodium sulphide, dissolving 4 ozs. in water and making up to 20 ozs. with water.

To make the working sulphide bath, mix:—

Stock 20% sulphide soln. ... 3 ozs.

Water, to make 20 ozs.

The prints are treated for two or three minutes in the bleacher—that is, until the picture becomes faint brown in colour. If any black is left at the end of two minutes it is a sign that the bleacher (which may be used repeatedly) is becoming pretty nearly exhausted.

Rinse in clean water for half-a-minute to one minute. Longer washing at this stage does no good and may impair the tone.

Transfer to sulphide bath, where prints should darken to the full brown or sepia in a second or two.

Throw away the sulphide bath after the day's use. Stale spoilt sulphide solution is the most frequent cause of bad tones or of refusal of prints to darken in the sulphide bath.

Finally wash for half-an-hour in running water.

The results by the sulphide process are quite permanent.

Blue stains, in spots and patches, on sulphide-toned prints are due to iron, either as rust in the tap-water or as impurity in alum. Fit a flannel filter to the tap and use pure alum.

Wiping the blue-stained print with cotton-wool saturated with strong hydrochloric acid will slowly change the stain to yellow, which washes out in water. But it is a rather risky remedy.

Sulphide-toned prints of bad

colour or insufficient depth can be re-treated, *e.g.*, by bleaching in :—copper bromide, 130 grs. ; sodium bromide, $2\frac{1}{2}$ ozs. ; water, 10 ozs. This is used in the dark room, the bleached print taken into daylight and re-developed with amidol or other clean developer, after which it may be re-toned. Over-dark sulphide-toned prints of light subjects, *e.g.*, sketch portraits or enlargements which are afterwards to be worked up, may be reduced by putting back into the ferri-cyanide-bromide bleach after washing out the sulphide darkening bath.

Hypo-Alum Toning.

The following is the method (much used on the commercial scale) for toning bromide and gaslight prints to a warm purplish sepia. Prints must be fixed in a hardening-fixing bath. They are then toned in a hot mixture of hypo, alum, etc., made as follows :—

Hot water	...	80 ozs.
		(2,000 c.c.s.)
Hypo	...	1 lb.
		(400 grms.)
Dissolve, and then add—		
Alum	...	$3\frac{1}{2}$ ozs.
		(90 grms.)

Stir well, boil for 2 or 3 minutes, cool to about 150 F. (65 C.), and then add the Silver Ripener, made as below :

Stir well again and add :	
Potass. iodide	... 40 grs.
	(3 grms.)

The whole mixture is thoroughly well stirred.

Silver Ripener.

Silver nitrate	20 grs
	(1 gm.)
Water	... 1 oz.
	(30 c.c.s.)

To this add drop by drop, strong (880) ammonia, until the precipitate first formed is just re-dissolved. Stir vigorously while adding the ammonia.

The toning bath can be used repeatedly, keeping up the bulk by occasional addition of fresh solution. The best results are obtained by keeping the bath hot, or as warm as the emulsion will stand, say 100° to 120° F. (38° to 50° C.). At this temperature prints will tone in from 20 to 30 minutes. The bath can be used cold, in which case toning takes about 24 hours, the prints requiring to be turned over every little while.

After using the hot bath, it is well, after toning, to pass the prints through a solution of :

Alum	...	2 ozs.
		(30 grms.)
Water	...	70 ozs.
		(1,000 c.c.s.)

Prints are finally washed thoroughly in water.

Liver of Sulphur Toning.

Liver of sul-	60 grs.
phur	(4 grms.)
Water	... 80 ozs.
	(2,000 c.c.s.)

This bath is used at about 80 deg. F., and tones in about 30 minutes, yielding results very similar to those with hypo-alum. Commercial papers are not, however, all equally suitable for "liver" toning.

Nitro-Sulphide Toning.

(W. B. Shaw's Process.)

This process is based on the fact that sulphide solutions of a suitable oxidising agent tone directly, thus obviating the necessity for an intermediate bleaching bath.

The nitro-sulphide process will

yield more pleasing results on "gaslight" papers than the bleach and sulphide method, the colours resembling those obtained by hypo-alum toning.

Stock solutions :

Solution A.

A saturated solution of barium sulphide. To prepare this, $\frac{1}{2}$ oz. (15 gms.) of barium sulphide is shaken up with 40 ozs. (1 litre) of warm water and the undissolved portion allowed to settle. The clear liquid is poured off for use. The bottle must be kept tightly closed.

Solution B.

A 10 per cent. solution of sodium meta-nitro-benzene sulphinate.

For use take : A. 4 ozs. (100 c.c.s.) and B. 2 drams (7 c.c.s.).

The best results are obtained by giving prints a generous exposure and developing with M.Q. The final tones vary considerably with different brands of paper, ranging from purple to warm brown. As the progress of toning is under direct observation, intermediate colours can be secured with ease.

With slow bromide and chlorobromide papers toning may be too rapid for convenient control. In such cases, the solution should be largely diluted with water.

If toning is carried to completion, fast contrasty papers usually give cold tones and slow normal papers warm ones.

The temperature of the toning bath should not be below 60° F. (16° C.).

Prints for this process need not be completely washed after fixing, but it is just as well to wash for a few minutes before toning.

Copper Toning.

A. Copper	60 grs.
sulphate	(7 gms.)
Potass. citrate	240 grs.
	(28 gms.)
Water	... 20 ozs.
	(1,000 c.c.s.)
B. Potass.	50 grs.
ferricyanide	(6 gms.)
Potass.	240 grs.
citrate	(28 gms.)
Water	... 20 ozs.
	(1,000 c.c.s.)

The citrate in this formula is the neutral salt.

Use equal parts of each. If prints are pinkish in the high-lights use more citrate in the A or B solution.

The copper toning process gives a range of tones from warm brown to bright red, according to the time of action of the solution. Toned prints last fairly well but are inferior in permanence to those made by the sulphide-toning method. The toning has scarcely any perceptible effect on the depth of prints.

In this mixture which must be used soon after making, prints gradually tone and pass through the stages of purplish black and brown to a decided red. Prints should be well washed from hypo before toning.

Uranium Toning.

This old method yields brown to reddish tones. It intensifies the prints, and the results often prove impermanent.

A. Uranium, ni-	90 grs.
trate	(10 gms.)
Water	... 20 ozs.
	(1,000 c.c.s.)
B. Potass. ferri-	90 grs.
cyanide	(10 gms.)
Water...	... 20 ozs.
	(1,000 c.c.s.)

Use equal parts of A and B.

and add 20 minims of glacial acetic acid to each ounce of mixture. The prints must be free from hypo. After toning wash in several changes of *still* water till the high-lights are clear. Washing in running water will remove the toning in patches. Citric acid (10 grs. per oz.) or oxalic acid (5 grs. per oz.) instead of acetic is an aid to pure whites.

As a means of rendering uranium-toned prints permanent it is recommended to fix the toned prints for five minutes in hypo, $\frac{1}{2}$ oz.; potass. metabisulphite, 70 grs.; water, 20 ozs.

Blue Tones.

A. Potass. ferri-	15 grs.
cyanide	(1.7 gms.)
Sulphuric acid,	30 minims
conc.	(3 c.c.s.)
Water ...	20 ozs.
	(1,000 c.c.s.)
B. Ferric ammonia	15 grs.
citrate	(1.7 gms.)
Sulphuric acid,	30 minims
conc.	(3 c.c.s.)
Water ...	20 ozs.
	(1,000 c.c.s.)

Mix equal parts of A and B at time of use. Prints should be light, as the toning also intensifies. When toned, wash to remove all yellow colour.

Gold Toning.

For improving the colour of greenish or rusty black prints, and for bluish tones.

Ammonium ...	30 grs.
sulphocyanide	(2 gms.)
Chloride of gold	2 grs.
	(0.13 gm.)
Boiling water ...	4 ozs.
	(110 c.c.s.)

Use as soon as cool. Place the wet print face upwards on a sheet of glass, squeegee into

contact, blot off superfluous moisture, and paint the above bath on with a broad flat brush; when the desired tone is reached wash well and dry.

Glazing Prints.

GLAZING SOLUTION.

(For Gelatine Prints only.)

In glazing prints by stripping from glass plates or ferrotype sheets, the best means for avoidance of sticking of prints is the use of a so-called "glazing" or "stripping" solution. In the use of rotary drying-glazing machines, a glazing solution may be of advantage in dealing with prints on a paper which does not strip easily. The glazing solution may be bought ready made or prepared from:—

Ox-gall,	1 oz.
prepared	(12 c.c.s.)
Water ...	80-160 ozs.
	(1,000 to 2,000 c.c.s.)

The prints are soaked in this solution for a minute or two and laid on the glasses without intermediate washing.

Those who do not object to the mess (and smell), may prepare ox-gall by buying gall-bladders from a butcher or slaughter-house, and mixing the fluid from a bladder with formaline in the proportion of about 2 ozs. formaline per gallon of gall. The mixture is filtered through several thicknesses of butter muslin, after which it is bottled and will keep for a long time.

A polishing medium to be applied to glass or ferrotype before squeegeeing the print is—

Beeswax ...	20 grs.
	(45 gms.)
Turpentine ...	1 oz.
or	(1,000 c.c.s.)

Spermaceti wax	20 grs.
	(45 grms.)
Benzole ...	1 oz.
	(1,000 c.c.s.)

a few drops of which are rubbed on with a piece of flannel, and the glass afterwards polished with silk rag or chamois leather.

ENAMEL COLLODION.

(For Glazing both Gelatine and Collodion Prints).

Soluble gun	50 grs.
cotton	(14 grms.)
Alcohol ...	4 ozs.
	(500 c.c.s.)
Sulphuric ether	4 ozs.
	(500 c.c.s.)

Glass plates cleaned with French chalk are coated with the above, and, as soon as coating has set, slipped under prints which are waiting face down in water. Prints are withdrawn and squeegeed. When they are half dry, a stout backing paper is pasted on with good thick photo-mountant, the prints then allowed to dry. The object of the backing paper is to prevent penetration

of moisture when the prints are mounted. They are finally stripped off.

Drawings from Ink or Prints.

The following process can be used with prints on bromide, gaslight or P.O.P. paper.

After outlining the subject in waterproof Indian ink, bleach out the image in—

Thiocarbamide...	240 grs.
	(25 grms.)
Nitric acid ...	4 drs. (fl.)
	(25 c.c.s.)
Water ...	20 ozs.
	(1,000 c.c.s.)

Or the following bleaching solution may be used:—

Iodine soln. ...	30 minims
	(6 c.c.s.)
Potass. cyanide	5 minims
	(1 c.c.)
Water ...	1 oz.
	(100 c.c.s.)

The iodine and cyanide solutions are each of 10 per cent. strength. The iodine is dissolved with aid of potass. iodide; the cyanide in plain water.

THE CARBON PROCESS.

Procedure.—Tissue, *i.e.*, paper coated with a mixture of gelatine and pigment colour, is made sensitive by immersion in bichromate solution, dried, and printed under the negative by daylight. As the colour of the tissue hides the effect of light, the printing is done by aid of an actinometer.

The effect of the light is to render the gelatine insoluble—deeper down into the tissue, the greater the action. “Development” consists in dissolving out in warm water the tissue which remains soluble.

As a skin of insoluble tissue is formed over the whole top

surface of the print, the coating is first transferred (face down) on to a fresh support.

To do this, the exposed tissue is soaked in cold water along with a sheet of (gelatine-coated) transfer paper, the two squeegeed together, put under pressure for about 20 minutes, and then placed in hot water.

The original support of the sensitive surface is stripped off leaving the tissue with its face (the insoluble side) on the transfer paper. The soluble gelatine can be then dissolved away (development), carrying the pigment with it, and the prints are finally passed through

an alum bath, washed and dried.

As this transference of the print to a new support causes the picture to appear reversed as regards right and left, it is necessary (where this is an objection) to transfer first on to a "temporary support" for development, and from this again on to the "final support."

Sensitising Solutions.

Potass. bichromate	1 oz. (35.50 gms.)
Water	20-30 ozs. (1,000 c.c.s.)
Liquor ammonia, 0.880	60 minims (6 c.c.s.)

A longer immersion in the weaker solution is practically equal to a shorter one in the stronger bath.

If the tissue is squeegeed on a glass plate after sensitising, the degree of squeegeeing (light or heavy) also modifies its sensitiveness by removing more or less of the solution.

If the tissue be squeegeed on to a ferrotype plate, and allowed to dry upon it, the drying may be done in the light of an ordinary room. The face of the tissue is then protected from light, dust, and injurious vapours.

FIXING OR HARDENING BATH.

Alum	1 oz. (50 gms.)
Water	20 ozs. (1,000 c.c.s.)

The following sensitising bath has also been recommended:—

Potass. bichromate	1 oz. (20 gms.)
Water	50 ozs. (1,000 c.c.s.)
Citric acid	$\frac{1}{2}$ oz. (5 gms.)
Liquor ammonia	quant. suff.

This bath is suitable for thin negatives, *i.e.*, those lacking in contrast, and the tissue sensitised in it will keep longer than that sensitised in the former solution. The tissue, however, is much less sensitive, and with vigorous or contrasty negatives, such as are best suited for carbon work, it is apt to yield prints that are hard, through the washing away of the more delicate tones in the development.

Bichromate Stains, Etc.

To remove bichromate stains from fingers, nails, etc., apply dilute ammonia to the parts until the stains disappear, then well wash the hands with warm water and soap.

Waxing Solutions.

No. 1 formula is for carbon prints or for removing collodion films.

1. Beeswax	20 grs. (10 gms.)
Benzole rect....	4 ozs.
No. 1	(1,000 c.c.s.)

No. 2 formula is for flexible supports.

2. Yellow resin	180 grs. (42 gms.)
Yellow beeswax	60 grs. (14 gms.)
Rect. spirit	10 ozs.
of turpentine	(1,000 c.c.s.)

Carbon Transparencies.

The following is a substratum for use in making carbon transparencies.

Nelson's No. 1 ...	$\frac{3}{4}$ oz. (37 gms.)
gelatine	
Water	20 ozs. (1,000 c.c.s.)
Potass. bichromate	12 grs. (1.4 gm.)

Well cleaned plates are coated with this and dried, when they

are fully exposed to light, which will render the coating insoluble.

Gelatine Solutions.

For transferring carbon pictures from flexible support to ivory opal, glass, &c.

Nelson's No. 1 ...	1 oz.
gelatine	(50 gms.)
Water ...	20 ozs.
	(1,000 c.c.s.)
Chrome alum ...	12 grs.
	(1.4 gm.)

The chrome alum is previously dissolved in 2 ozs. (100 c.c.s.) of water and the solution added to that of the gelatine.

For coating, drawing-papers for the single transfer process

Nelson's No. 1	1 oz.
gelatine	(50 gms.)
Water ...	20 ozs.
	(1,000 c.c.s.)
Chrome alum ...	20 grs.
	(2.3 gms.)

Apply with a brush.

The chrome alum is previously dissolved in 2 ozs (100 c.c.s.) of water and the solution added to that of the gelatine.

In adding a solution of chrome alum to one of gelatine, both solutions should be at a fairly high temperature, 130° to 160°F.

THE CARBRO PROCESS.

In this process a carbon print is made from a bromide print or enlargement without the aid of daylight.

A good bromide print must first be prepared, care being necessary to ensure correct exposure and full development. Weak, flat bromides give unsatisfactory results.

The print, which has been thoroughly washed and dried, is placed in a dish of clean water, and should remain in this until quite limp or until required.

A piece of carbon tissue of the required size, which must be about $\frac{1}{4}$ in. larger each way than the bromide print, is "sensitised" by immersion for three minutes in the "sensitising bath" given below containing potassium bichromate, ferricyanide and bromide.

During this time the bromide print should be removed from the water and laid face upwards on a sheet of stout glass.

When the tissue has been in the "sensitising" bath for the requisite time it is removed, and allowed to drain for 15 seconds. It is then placed in the acid-formaline bath. The time of immersion in this solution varies according to the brilliancy desired in the resulting print, and may be from 15 to 25 seconds, the longer immersion giving greater softness.

STOCK SOLUTION No. 1.

(For making Sensitising Bath.)

Potass. bichromate	1 oz.
	(10 gms.)
Potass.ferricyanide	1 oz.
	(10 gms.)
Potass. bromide	1 oz.
	(10 gms.)
Water ...	20 ozs.
	(200 c.c.s.)

Sensitising Bath for Use.

Stock solution No.1	6 ozs.
	(100 c.c.s.)
Water ...	18 ozs.
	(300 c.c.s.)

This bath may be used repeatedly, but should be strained

through fine muslin or cotton wool after use.

STOCK SOLUTION No. 2.
(For Acid-Formaline Bath.)

Acetic acid, glacial	1 oz.
	(10 c.c.s.)
Hydrochloric acid, pure	1 oz.
	(10 c.c.s.)
Formaline ...	22 OZS.
	(220 c.c.s.)
Water ...	1½ OZS.
	(15 c.c.s.)

The formaline is the commercial 40 per cent. solution of formaldehyde.

Acid-Formaline Bath for Use.

Stock solution No. 2 1 oz.

Water ...	(10 c.c.s.)
32 OZS.	
	(320 c.c.s.)

Renew this bath frequently as contamination with "sensitiser" lessens its activity.

The tissue is now laid face downwards upon the bromide print, and the two squeegeed into contact. A flat squeegee is used, and particular care taken that the tissue does not move on the surface of the bromide during the early stages of squeegeeing.

Both print and tissue are now lifted from the glass, and placed between greaseproof paper, where they are allowed to remain for 15 minutes. During this time a piece of transfer paper, similar to that used in carbon printing and larger in size than the tissue in use, is selected and placed in a dish of water.

If a thin transfer paper is used, allow it to soak for 5 minutes, while, if thick, 10 minutes will be necessary.

The transfer paper is then laid face upwards upon a sheet of glass, and is ready to receive the carbon tissue.

The bromide print and its adhering tissue should now be taken from between the grease-proof paper, and the two carefully separated by lifting one corner of the print and gently but decisively pulling the two surfaces apart. The bromide print should be dropped into a dish of water, and the tissue placed film down upon the transfer paper.

The tissue is then squeegeed to the support transfer paper, and the two placed between blotting paper for from 20 to 40 minutes. The bromide print, after well washing, may be re-developed for future use.

When the tissue and final support have been in contact for the required time they are placed in a deep dish of water at a temperature of 95° to 100° F. In a few minutes the pigmented gelatine begins to dissolve: colour oozes out at the edges of the tissue.

The two papers are now separated by taking a corner of the tissue and gently pulling the two apart under the water. The majority of the pigmented gelatine will now be found upon the transfer paper, and development of the image is proceeded with by pouring warm water over the surface of the print. The image is very tender at this stage, and care should be taken that nothing touches its surface. When development is complete the print is transferred to a 3 per cent. solution of alum, and when all signs of yellowness in the high-lights have disappeared, is washed for a few minutes in water, and then hung up to dry.

GUM-BICHROMATE.

The following (greatly abridged) are working instructions in this now little-used process according to perhaps the most accomplished exponent of it, M. Robert Demachy.

The gum solution is one of ordinary gum arabic of 50 per cent. strength in cold water.

The sensitiser is a saturated solution of potass. bichromate.

To make the sensitive solution 1 part of bichromate solution and 2 parts of gum solution are mixed, and then moist water-colour tube pigment added in sufficient quantity, as ascertained by trial.

The paper is coated by applying the mixture with a flat hog's hair brush, afterwards smoothing the coating with two wide, flat hog's hair brushes.

Exposure under a quick-printing negative ranges from 10 minutes (in the shade on a bright summer day) to much longer.

Prints are developed either by simply soaking in cold or tepid water, by pouring water over the print supported on a glass plate, or by delicate friction with a wet brush or sponge.

THE BROMOIL PROCESS.

In this form of the oil process a bromide print or enlargement is treated so as to bleach the image and at the same time bring the print into a condition similar to that produced by exposure of sensitised paper in the oil process.

The bleach is made from the two following stock solutions:—

- | | | |
|----|--------------------|----------------|
| A. | Copper chloride | 160 grs. |
| | | (36.5 grms.) |
| | Sodium chloride | 2oz. 290 grs. |
| | (common salt) | (270 grms.) |
| | Hydrochloric acid | 3 minims |
| | | (0.6 gm.) |
| | Water... | 10 ozs. |
| | | (1,000 c.c.s.) |
| B. | Potass. bichromate | 55 grs. |
| | | (12.5 grms.) |
| | Water... | 10 ozs. |
| | | (1,000 c.c.s.) |

The bleach is made up by mixing 1 oz. of A, 1 oz. of B, and 2 ozs. of water.

The bromide print is soaked in water for about 5 minutes until limp, drained from surface moisture and placed in the bleacher. Within from 3½ to 4½ minutes the picture is converted into a faint brownish image. When thus fully bleached the print is washed in running water for about 15 minutes to free it from yellow stain and is then fixed in a hypo bath containing 1 oz. of hypo in 20 ozs. of water. It is then again washed for about half an hour.

Before pigmenting the print is soaked in warm water, the temperature of this water requiring to be adjusted to the quality of the bromide paper. Average temperatures are those from 70 to 80° F. (21-27° C.). The print is soaked for a time which may range from 15 to

45 minutes and is then ready for pigmenting.

Separate Bleaching.

Venn Method.

Bromide prints, developed to a Watkins factor of 8 in the maker's amidol developer, used at half strength, are transferred directly after draining to a 10 per cent. hypo solution for 5 minutes. They are then thoroughly washed and dried.

After soaking for 5 minutes, the print is bleached in :—

Copper sulphate 95 parts
(10% soln.)

Potass. bromide 5 parts
(10% soln.)

After remaining here half a minute after the bleaching appears complete, the print is

drained and put directly in :—

Potass. bromide	4 ozs.
(10% soln.)	(200 c.c.s.)
Potass. bichromate	2 ozs.
(1% soln.)	(100 c.c.s.)
Water to make...	20 ozs.
	(1,000 c.c.s.)

for four minutes.

After washing for five minutes in several changes of water, it is fixed for two minutes in 10 per cent. hypo, washed for fifteen minutes in one or two changes of water and dried. A temperature of 60-65° F. (15.5-19° C.) should be maintained through these operations.

Before inking up, the dried prints are soaked for times ranging from 30 to 45 minutes.

To dry a Bromoil quickly, soak in methylated spirit and hang up.

THE OIL PROCESS.

Gelatine-coated paper is sensitised with bichromate, printed under the negative, and treated in cold water. The faint image has the power of fixing greasy ink.

SPIRIT SENSITISER (*Demachy*).

Prepare 6 per cent. ammonium bichromate stock solution by dissolving 1½ ozs. of this salt in 25 ozs. of water.

To make the sensitiser mix at time of use :—

Stock bichromate 1 part.
solution

Alcohol, pure 90° 2 parts.

The sensitiser is applied with a flat hog-hair brush, about ¾ oz. serving for six 10 × 8 sheets of transfer paper.

The paper dries in about 18 minutes, and is printed under

the negative until it shows a brown image as in the platinum printing process. The detail should show in the high-lights.

It is then soaked in several changes of water to remove the yellow bichromate (about 20 minutes), and then soaked for a further time (in a dish of water), depending on the thickness of the gelatine coating. An average time is 30 minutes; 2 to 3 hours, for more heavily coated papers. The temperature of the water should be between 65° and 70° F.

The print can be pigmented forthwith, or dried for pigmenting later on. If it is dried it requires about an hour's soaking in water at 65° to 70° F. to bring it into the best condition for pigmenting.

PALLADIOTYPE.

In the Palladiotype process, which was introduced some years ago by the Platinotype Company, the stable metal palladium replaces platinum. With the exception that the solutions employed are different from those used for Platinotype the procedure is exactly the same. Palladiotypes afford by cold development rich warm-black prints, free from double tones, or inclination to greenish hue, and closely resemble Platinotype prints.

DEVELOPER.

Sodium citrate	8 ozs.
	(227 gms.)
Citric acid ...	$\frac{1}{2}$ oz.
	(14 gms.)
Water ...	46 ozs.
	(1,300 c.c.s.)

To be used without dilution at 65° to 70° F. (18° to 21° C).

The prints should be developed as soon after printing as feasible and, at least, one minute allowed for full development. They are then transferred direct to the first clearing bath.

The addition of small quantities of potass. bichromate to the developer gives added contrast without loss of quality. From one grain to 4 grains to 20 ozs. may be used according to the effect desired. Printing should be slightly longer than the normal.

CLEARING BATH.

Stock Solution.

Sodium citrate	6 ozs.
	(170 gms.)
Citric acid ...	2 $\frac{1}{2}$ ozs.
	(70 gms.)
Water ...	26 ozs.
	(740 c.c.s.)

For use mix one part of stock solution with 7 parts of water.

Three baths are required, the times of immersion being not less than 5, 10 and 20 minutes respectively. These periods may be prolonged, within reason, without detriment. The prints are then washed for not less than 20 minutes (in several changes of water) and suspended to dry.

PLATINUM PRINTING.

In the platinum process the paper is coated with a sensitive iron (ferric) salt, and a salt of platinum. On exposure to daylight, or equivalent, the iron salt is reduced to the ferrous state, the change being accompanied by a darkening which enables the depth of printing

to be judged. Printing should be continued until all details, except in the highest lights, are visible in the preliminary image.

Development is done by either floating on, or immersing in, a solution the principal ingredient of which is potassium

oxalate. The ferrous salt is soluble in this solution, and in the act of dissolving reduces the platinum salt *in situ* in extent corresponding with the reduction of the ferric salt by light, the permanent picture in finely divided platinum appearing simultaneously. To secure the full beauty of the process, correct exposure and full development are essential. Correctly exposed prints cannot be overdeveloped; the action automatically ceases when all the ferrous salt has been dissolved. Not less than one minute should be allowed for cold development; with hot solutions a few seconds suffice.

No fixing is required, but to eliminate iron and other salts remaining after development, the prints must first be washed in dilute hydrochloric acid solution. This is the operation known as "clearing." The acid is essential, for if omitted, basic compounds will form and the paper will discolour with age. Accordingly, the prints are transferred direct from the developer to the first clearing bath, in which they should remain for about 5 minutes. They are then removed to a second bath for 10 minutes, and again to a third bath for about 15 minutes.

The clearing solution for "black" prints should contain 1 oz. of pure hydrochloric acid to 60 ozs. of water; for "sepia" papers the quantity of water may be increased to 80 ozs. with advantage.

After clearing, the prints are washed for about 15 minutes (four or five changes of water are sufficient) and suspended to dry. Drying between blotters is a frequent cause of stains.

The following are the developers recommended by the Platinotype Company, the original patentees and manufacturers of the papers. Purity of the chemicals is of the utmost importance. Those supplied by the Company are tested, and can be relied upon.

Cold-Bath Developer.

To be used for all grades of "Black" Platinotype paper at a temperature of 65° to 70° F. (18° to 21° C.)

Stock Solution.

Potass. oxalate ...	14 ozs. (400 gms.)
Potass. biphosphate	2 ozs. (56 gms.)
Oxalic acid ...	$\frac{1}{2}$ oz. (14 gms.)
Water ...	96 ozs. (2,700 c.c.s.)

For use dilute with equal bulk of water.

Hot-Bath Developer.

To be used for Sepia Japan Papers only, at temperature 160° to 170° F. (71° to 77° C.)

Formula for Stock Solution as the foregoing, but with water reduced to 80 ozs.

For use dilute with equal bulk of water.

To be used for matt-surface Sepia papers at temperature 160° to 170° F. (71° to 77° C.)

Potass. oxalate ...	16 ozs. (450 gms.)
Oxalic acid ...	200 grs. (13 gms.)
Water ...	64 ozs. (1,800 c.c.s.)

To be used without dilution.

During heating and when not in use the hot-bath developers should be kept covered with a sheet of glass, cut only a shade larger than the top of the dish.

IRON PRINTING PROCESSES.

Ferro-Prussiate Sensitiser.

The following is a sensitising solution for paper to be used for printing by daylight and to be kept in good condition for a considerable time (months):—

- A. Ferric ammonia 110 grs.
citrate (green) (250 grs.)
Water, to make 1 oz.
(1,000 c.c.s.)
- B. Potass. ferri- 40 grs.
cyanide ... (90 grs.)
Water, to make 1 oz.
(1,000 c.c.s.)

Mix in equal parts, keep in the dark, and filter just before use.

If the ordinary brown citrate be used, the formula should contain 80 grs. (188 grs.), and the ferri-cyanide should be increased to 60 grs. (137 grs.)

The sensitiser is applied with a brush or sponge. The paper is printed until the shadows bronze, and is "developed" simply by soaking in one or two changes of plain water.

The following is a sensitising solution yielding a very much more rapid paper but of inferior keeping qualities, *i.e.*, keeping in condition for about 60 days:—

- Ferric ammonium citrate, 26% solution ... 6 parts.
Ferric ammonium oxalate 10% solution ... 2 "
Ferric sodium oxalate, 10% solution ... 2 "
Ferric chloride, 7% solution ... 2 "
Oxalic acid, 10% solution ... 2 "
Potass. ferricyanide, 10% solution ... 1 part.

Solution for Writing Titles on, removing blue lines from blue prints, etc.—Potass. oxalate, 75 grs. per oz.; 170 grs. per 1,000 c.c.s.

Brightening the Colour.—Blue prints are improved in colour by a final bath of 2½ per cent. alum solution, 3 per cent. oxalic acid or 1 per cent. hydrochloric acid.

The Kallitype Process.

Paper, sensitised as below, is printed to a semi-visible image, like platinum paper. It yields prints from black to sepia, according to the developer. If prints are fixed in a mixture of hypo and ammonia the results are reasonably permanent.

The sensitiser is made from the following stock solutions with addition of silver nitrate:—

- A.—Ferric oxalate (pure and fresh), 20% solution.
B.—Ferric potass. oxalate, 1:16 solution.
C.—Potass. bichromate, 1:16 solution.
D.—Oxalic-ammonia solution, consisting of:—Oxalic acid, 240 grs.; ammonia, 880,100 minims; water, 4 ozs.

Sensitiser.

- A ... 1 oz. (28 c.c.s.) C ... 4 drops.
B ... ½ oz. (14 c.c.s.) D ... 30 minims (1.8 c.c.s.)

To the above mixture of A, B, C and D is added silver nitrate cryst., 36 grs. (2.3 grs.)

Paper thus sensitised yields prints of full gradation and half-tone from ordinary negatives, such as print well in P.O.P.

For flat negatives further bichromate solution may be used in the developer.

DEVELOPERS.

For Black Tones.

Borax	...	...	2 ozs. (100 gms.)
Rochelle salt	...	...	1½ ozs. (75 gms.)
Water, to make	...	...	20 ozs. (1,000 c.c.s.)
Potass. bichromate sol. (1%)	...	...	15-18 drs. (90-115 c.c.s.)

For Purple Tones.

Borax	...	...	½ oz. (28 gms.)
Rochelle salt	...	...	2 oz. (100 gms.)
Water, to make	...	...	20 ozs. (1,000 c.c.s.)
Potass. bichromate sol. (1%)	...	...	15-18 drs. (90-115 c.c.s.)

For Sepia Tones.

Rochelle salt	...	...	1 oz. (50 gms.)
Water, to make	...	...	20 ozs. (1,000 c.c.s.)
Potass. bichromate sol. (1%)	...	...	8-10 drs. (50-60 c.c.s.)

Prints are allowed to remain in either of the above developers for from 15 to 30 minutes. They are then fixed for at least 10 minutes.

FIXING SOLUTION.

Hypo	...	...	1 oz. (50 gms.)
Ammonia (0.880)	...	...	120 minims. (12 c.c.s.)
Water, to make	...	...	20 ozs. (1,000 c.c.s.)

Sepia Paper.

This process and the single-solution sensitiser given below may be used for printing from ordinary negatives, but the results are deficient in gradation. Both are excellent for making duplicates of plans, etc., and give a copy in white lines on a

brown ground from an ordinary tracing. This copy may be used as a negative for preparing further "positive" copies.

A. Ferric ammonia citrate (green)	110 grs. (250 gms.)
Water, to make	1 oz. (1,000 c.c.s.)
B. Tartaric acid	18 grs. (40 gms.)
Water, to make	1 oz. (1,000 c.c.s.)
C. Silver nitrate	45 grs. (100 gms.)
Water, to make	1 oz. (1,000 c.c.s.)
D. Gelatine	30 grs. (70 gms.)
Water	1 oz. (1,000 c.c.s.)

Equal parts (say 1 oz. of each) of these solutions are mixed as follows:—D is rendered just fluid on a water bath, A and B added, and lastly C, a few drops at a time. Fix in 1 : 50 hypo.

Pellet Process.

The Pellet process is for copies of line drawings only. From an ordinary tracing it gives a copy in blue lines on a white ground.

A. Pure gum arabic	4 ozs. (200 gms.)
Water	20 ozs. (1,000 c.c.s.)
B. Ferric ammonia citrate	10 ozs. (500 gms.)
Water	20 ozs. (1,000 c.c.s.)
C. Ferric chloride (crystallised)	10 ozs. (500 gms.)
Water	20 ozs. (1,000 c.c.s.)

Add 8 vols. of B, then 5 vols. of C to 20 vols. of A, in small doses with constant stirring.

The prints are developed on 10 per cent. solution of potass. ferrocyanide and "fixed" in

1 : 25 sulphuric acid (specific gravity 1.84).

Ferro-Gallic Process.

This process is for line drawings only. It gives a copy in bluish-black lines on a white ground from an ordinary tracing.

Gum arabic... ... 60 grs.
(135 grms.)
Warm water ... 1 oz.
(1,000 c.c.s.)

When dissolved add the following in the order given:—

Tartaric acid ... 8 grs.
(18 grms.)
Salt ... 36 grs.
(81 grms.)
Ferric sulphate ... 40 grs.
(90 grms.)
Ferric chloride... 60 grs.
(135 grms.)

The developer for the prints is:—Alum and gallic acid, 1 part of each; water 80 parts.

MOUNTANTS.

Starch Paste.

Mix pure starch powder with a very small proportion of cold water to form a very stiff mass. It should be so stiff that it is stirred with difficulty.

Perfectly boiling water is then poured in, about 12 ozs. for every ounce of starch.

On stirring, the mixture will jelly without being boiled; but if it does not it is brought to the boil, cooled, the skin taken off, and the paste used on day of making.

Dextrine Paste.

Dextrine, best 2½ lbs.
white (1,200 grms.)
Water at 160° F. 64 ozs.
(1,720 c.c.s.)
Oil of wintergreen 15 minims
(1 c.c.)
Oil of cloves ... 15 minims
(1 c.c.)

Place the water in a vessel standing in a larger vessel of water kept to within 1° of 160° F. Stir in the dextrine slowly, and when it has all dissolved add the two preservative oils, stirring all the time.

Then allow to cool, pour into bottles, and cork. Put aside in a cool place for a week or two for the mixture to congeal to a firm white smooth paste.

Liquid Gelatine.

Gelatine... ... 1 oz.
(100 grms.)
Water ... 6 ozs.
(600 c.c.s.)
Chloral hydrate 1 oz.
(100 grms.)

The gelatine is dissolved in the water by aid of heat, and the chloral hydrate added. After digesting for a short time the adhesive liquid is neutralised with a little sodium carbonate solution.

Gelatine.

Nelson's No. 1 4 ozs.
gelatine (50 grms.)
Water ... 16 ozs.
(200 c.c.s.)

Soften the gelatine in the water, liquefy on a water bath, and add (a little at a time and stirring rapidly):—

Methylated spirit 5 ozs.
(60 c.c.s.)
Glycerine ... 1 oz.
(12 c.c.s.)

The mountant is used hot. A piece of ground glass is dipped in hot water, drained, and the mountant brushed over it. The print is then laid face up on the pasted surface and rubbed gently in contact with a piece of paper, being then removed and pressed down on its mount.

Starch-Gelatine.

A. Bermuda arrow-	8 ozs.
root ...	(200 grs.)
Water ...	4 ozs.
	(100 c.c.s.)
B. Nelson's No. 1	360 grs.
soft gelatine	(20 grs.)
Water ...	64 ozs.
	(1,600 c.c.s.)

The gelatine is first softened in the water, and A and B are then mixed together and boiled for a few minutes. To the cold mixture are stirred in—

Methylated spirit	5 ozs.
	(125 c.c.s.)
Carbolic acid	25 minims
(liquid)	(1.3 c.c.s.)

This is a good cold paste, which sticks and keeps fairly well.

Starch-Dextrine.

Water (cold) ...	5 ozs.
	(1,000 c.c.s.)
Starch ...	60 grs.
	(27 grs.)
Dextrine, best	2 ozs.
white ...	(400 grs.)
Sodium carbon-	6 grs.
ate, cryst	(2.7 grs.)
Oil of cloves ...	8 minims
	(3 c.c.s.)

The ingredients are well mixed together in the order given, so as to form a milklike fluid quite free from lumps. This is gradually brought to the boil (stirring all the time) and then poured into suitable jars, which it

should nearly fill. When cool the surface skin is taken off and the jars well stoppered. In one or two days' time the mixture should have set to a smooth white paste, of excellent keeping quality. The sodium carbonate is required principally to neutralise any residual acid in the dextrine. Less than the quantity indicated may be found sufficient. When set, the paste should be either neutral or slightly alkaline to litmus paper.

Shellac Mountant.

A strong solution of shellac in methylated spirit, or better, rectified spirit, is thinly applied to both mount and print, and the two coated surfaces quickly rubbed into contact. This is a good method of fixing prints to thin mounts in albums, etc.

Fixing Paper to Metal.

Tragacanth ...	3 ozs.
	(80 grs.)
Gum arabic ...	12 ozs.
	(240 grs.)
Water ...	50 ozs.
	(1,000 c.c.s.)

Mounting on Glass.

Prints on gelatine printing paper may be mounted face down on glass with a solution of gelatine. (See below). Prints mounted in this way were formerly largely sold as "opalines."

Nelson's No. 2	2 ozs.
soft gelatine...	(30 grs.)
Water ...	20 ozs.
	(300 c.c.s.)

The gelatine is soaked in the water, and liquified by standing the vessel in hot water. The solution is thinned down until nearly as thin as water. Print and glass are immersed, removed together, and squeezed together.

WORKING UP, COLOURING, ETC.

Lubricant for Prints.

This lubricant is used when burnishing prints with a steel roller.

Powdered Castile soap	20 grs. (5 grms.)
Alcohol	10 ozs. (1,000 c.c.s.)

Encaustic Paste.

Purified beeswax	50 parts
Oil of lavender	30 parts
Benzole	30 parts
Gum elemi	1 part

BASKETT'S FORMULA.

To the contents of a 2½ d. tin of Globe polish add 1 oz. best olive oil and 1 oz. terebinte. Apply with soft cloth and polish.

For reducing bromide prints, use in exactly the same way as for negatives.

Finishing Materials.

- Conté Black Stumping Chalk (Velours à Sauce).
- Conté Sepia Stumping Chalk (Velours à Sauce).
- Conté Powdered Black Lead.
- Conté Powdered Charcoal.
- Velvet Black or Intense Black Pastel (finest soft).

Prepare the bromide print by first rubbing over with pumice flour with a tuft of wool or flannel in a circular manner, and remove with another piece of wool or duster.

Mix the chosen powder with pumice flour to the tint required and apply with a stump or tortillon. For picking out lights use putty rubber. For sharp lines, use conté crayons in cedar. Special pencils are sold for

sulphide-toned prints. If the finish is slight and the powder lightly applied it can be fixed by steaming the print.

GLOSSY BROMIDES.

For invisible finishing on glossy paper apply a few grains of spirit nigrosine black, dissolved in "methylated finish," with a rag or brush. In order to match a print, tone the black with Bismarck Brown.

Preparing for Colouring.

GLOSSY BROMIDE AND P.O.P.

Rub the prints lightly with a tuft of wool slightly moistened with artists' purified ox-gall. If they have been lubricated before burnishing apply previously a little alcohol in the same way.

COLLODION PRINTS.

Fluid extract of quillaia	1 dram (5 c.c.s.)
Water	1 oz. (40 c.c.s.)
Alcohol	1 oz. (40 c.c.s.)

BROMIDES.

For Water Colouring.

Apply ox-gall as directed for P.O.P., or prepare as directed below for chalk work.

For Oil Colouring.

If the surface is clean no preparation is needed; if otherwise, give a wash of gum, starch, or gelatine, or prepare with pumice powder. Also light drying oil (from the artists' colourman) may be rubbed over with a tuft of wool or the fingers. It dries in about twenty-four hours.

and leaves the surface of the bromide ready for painting.

Fixative (Crayon and Pastel).

A. Mastic ... 24 grs.
(1.6 gm.)

Amyl acetate ... 3 ozs.
(85 c.c.s.)

Dissolve by agitation, and allow to stand for some hours before use.

B. Celluloid ... 7 grs.
(0.45 gm.)

Amyl acetate ... 3 ozs.
(85 c.c.s.)

Dissolve by agitation. Mix A and B when both are clear, and keep in tightly-corked bottle. Apply with spray diffuser.

Colouring in Oils.

(Lantern Slides.)

Canada Balsam thinned with turpentine is a very useful medium for colouring slides in conjunction with transparent oil colours, those indicated * below being suitable.

Spotting Bromide Prints.

Mix together Payne's grey and Indian ink (the colour should match that of the film). For sepia, Indian ink and burnt sienna.

Spotting P.O.P. Prints.

Add a little carmine to the above. When mixture is dry (on the palette), work in a strong solution of gum, rubbing the brush one way only, to avoid making air-bells. If the prints are to be enamelled or glazed by stripping after spotting, then artists' oil colours with benzole in which gum dammar has been dissolved, or water colours, may be used with shellac water varnish. (See "Negative Varnishes.")

Crystoleum.

The print (which should be on albumenised paper on account of its thin substance and fine texture) is mounted with a warm solution of:—

Hard gelatine ... 20 grs.
(45 gms.)

Water ... 1 oz.
(1,000 c.c.s.)

containing a little salicylic acid to keep it. Or with a cold mountant made by mixing the above with an equal amount of starch paste.

VARNISH FOR "TRANSLUCING."

Canada balsam... 5 ozs.
(100 gms.)

Solid paraffin ... 2 ozs.
(40 gms.)

White wax ... 2 ozs.
(40 gms.)

This is melted, the picture immersed, and the whole kept as cool as possible consistent with remaining fluid.

Artists' Water Colours.

The following are suitable colours for bromide enlargements, platinum, and carbon prints. The colours in ordinary type are permanent; those in italics are more or less doubtful except under special precautions against exposure. Those marked * are transparent.

*Alizarin Scarlet. *Flesh Tint*, No. 1. *Flesh Tint*, No. 2. *Flesh Tint*, No. 3.

*Indian Red. *Rose Madder. Venetian Red. Vermilion.

*Antwerp Blue. Cobalt Blue. *French Ultramarine. Indigo.

*Prussian Blue. *Brown Pink. *Burnt Sienna. Cadmium Yellow.

Chrome Lemon. *Chrome Orange*. *Indian Yellow. Naples Yellow.

*Raw Sienna. Roman Ochre

Yellow Ochre. *Emerald Green.*

**Hooker's Green, No. 2. Terre Verte. *Brown Madder. Payne's Grey.*

Raw Umber. Sepia. **Van-*

*dyke Brown. *Ivory Black, Lamp Black. Chinese White.*

The above colours are also made specially, in small pots, for air-brush work.

LANTERN SLIDES.

Lantern plates fall into three main groups, viz.:

Rapid (Black-tone).

These require to be handled in the dark room by bright yellow safelight. In general they give black tones. Some varieties, however, allow warm tones to be obtained with ease. Especially suitable for printing by reduction, and when the closest tone reproduction is desired.

For a cold black tone and with a normal, correctly exposed negative, an exposure of about 5 secs. will be required at three feet from a 16 c.p. bulb. Any standard plate developer (*e.g.*, amidol, hydroquinone, metol-hydroquinone, *etc.*) may be used. For warmer tones pyro-ammonia or dilute ortol developers are the most suitable.

Slow (Warm-tone).

Of slower speed, but still preferably used in the dark room. These plates give a rather stronger contrast and are particularly adapted for making slides of warm colour, ranging from brown to red. The exposure requires to be about four times that for a black-tone plate. When warm black, brown or red tones are desired, the exposure is increased and development carried out in a

caustic soda-hydroquinone developer heavily restrained with bromide, or in a much diluted M.Q. developer.

Gaslight, etc.

Plates of slow speed, for use in ordinary rooms under conditions as for gaslight-paper printing, giving vigorous contrast and allowing of a wide range of warm tones by direct development. Suitable for printing (by contact) negatives which are excessively soft in contrast. At six inches from a 32 c.p. bulb the exposure required to give a normal (cool-black) tone with a correctly exposed negative will be in the neighbourhood of 45 seconds; and with an appropriate M.Q. or amidol developer (as compounded for gaslight paper), development takes only about 30 seconds at 65° F.

When an M.Q. solution containing ammonium bromide and carbonate is employed to obtain warm tones, the exposure is increased up to about five times, development then requiring about 2½ minutes.

In addition to the above, there are a few special varieties, notably the Ilford "Alpha" lantern plate, which gives a very wide range of tones by development and toning.

Pyro-Caustic.*For Rapid Plates.*

Soda sulphite	180 grs.
cryst.	(21 gms.)
Ammonium	60 grs.
carbonate	(7 gms.)
Ammonium	30 grs.
bromide	(3.5 gms.)
Caustic potash	50 grs.
	(5.7 gms.)
Water, to make	10 ozs.
	(500 c.c.s.)

Add, at time of use, either dry or as 10 per cent. solution:—

Pyrogallic	30 grs.
acid	(3.5 gms.)

Hydroquinone-Rodinal.*For Slow Plates.*

Specially recommended by J. W. Shaw for soft, brown-black tones of great richness on warm-tone plates.

A. Hydroquinone	640 grs.
	(25 gms.)
Soda sulphite	8 ozs.
	(140 gms.)
Citric acid ...	240 grs.
	(9.0 gms.)
Potass. bromide	120 grs.
	(4.5 gms.)
Water, to make	80 ozs.
	(1,400 c.c.s.)
B. Sodium hy-	640 grs.
drate	(25 gms.)
Water, to make	80 ozs.
	(1,400 c.c.s.)
For use, mix as follows:—	
Solution A ...	120 minims
	(24 c.c.s.)
Solution B ...	120 minims
	(24 c.c.s.)
Rodinal (con-	5 minims
centrated)	(1 c.c.)
Potass. bromide	60 minims
(10% soln.)	(12 c.c.s.)
Water ...	1 oz.
	(100 c.c.s.)

Development 2-2½ mins. at 60° F. (15.5° C.)

Chlorquinol.*For Slow Plates.*

An excellent developer for warm tones is as follows:—

Soda sulphite,	½ oz.
cryst.	(25 gms.)
Soda carbonate,	½ oz.
cryst.	(25 gms.)
Potass bromide,	50 minims
10% solution	(5 c.c.s.)
Chlorquinol ...	60 grs.
	(7 gms.)
Water ...	20 ozs.
	(1,000 c.c.s.)

Development should take from 2½ to 4 minutes at 65° Fahr.

For warm-brown tones add ½ ounce of 10% potass bromide solution to each ounce of the above Chlorquinol developer and give three times the normal exposure.

For reddish tones add ¼ ounce of 10% ammon. bromide solution to each ounce of the above Chlorquinol developer and give 12 times the normal exposure.

With these restrained developers, the time of development must be increased in order to obtain satisfactory contrast.

Metol-Hydroquinone.*For Gaslight Plates.*

Brown-tone slides are also given by an M.Q. developer used by Dudley Johnston as follows:—

Metol ...	50 grs.
	(1.44 gms.)
Hydroquinone	35 grs.
	(1 gm.)
Soda sulphite	240 grs.
anhydrous	(6.9 gms.)
Soda carbonate,	240 grs.
anhydrous	(6.9 gms.)
Water, to make	20 ozs.
	(250 c.c.s.)

For use, take 3 parts of the above, add 1 part of ammonium carbonate (10 per cent. soln.), 1 part of ammonium bromide

10 per cent. soln.), add 4 parts of water and use at 75 deg. F. (24° C.).

For fine sepia tones, add 15 minims of 10 per cent. hypo solution per ounce of mixed developer; for cold sepias, double this amount of hypo.

Thiocarbamide.

The thiocarbamide developer for lantern slides is one which yields a wide range of colours by simple development, ranging from magenta red through purple to blue and bluish-grey and on to neutral grey and black. Brown tones even are obtainable. The colours and the quality of the image are very fine. The warmer colours are obtained by greatly increased exposure in conjunction with the necessary modification in the composition of the developer. The method was worked out by Dr. C. E. K. Mees for Messrs. Wratten & Wainwright in 1908.

Stock Solutions.

A. Metol ...	44 grs. (10 gms.)
Hydroquinone	22 grs. (5 gms.)
Soda sulphite crist.	1 oz. (100 gms.)
Soda carbon- ate, crist.	1 oz. (100 gms.)
Water, to make	20 ozs. (2,000 c.c.s.)
B. Ammonium carbonate ...	1 oz. (50 gms.)
Ammonium bromide	1 oz. (50 gms.)
Water, to make	10 ozs. (500 c.c.s.)
C. Thiocarbamide	33 grs. (3 gms.)
Ammonium bromide	11 grs. (1 gm.)
Water, to make	10 ozs. (400 c.c.s.)

The chief difficulties in thiocarbamide development are (1) judging the correct density, (2) obtaining the desired colour. It is not difficult to obtain either of these separately, but it is not easy to get both together, as both depend upon the same factor, viz., length of time of development.

The slide passes through a regular sequence of colour changes, beginning with yellow and passing thence to red, purple, blue-grey and ultimately black, although it is impossible to follow these changes with the eye during development. The problem thus becomes one of so adjusting, exposure and developer that the correct density is reached at the same time as the desired colour.

This would appear to be impossible unless the contrast of the negative were just correct for the purpose, and Dr. B. T. J. Glover (B.J., March, 1923) says the negative must be adjusted to that end by reduction or intensification. This is correct for a given temperature, but experience shows that by alterations of temperature a compensating factor can be introduced.

The best way to use this developer is the factorial method, a factor of 6 being about correct for 70° F.; but density is obtained more readily at higher temperatures and the factor will therefore become less as temperature is increased. The developer is extremely sensitive to slight changes of temperature and success depends upon maintaining the developer at an even temperature with the aid of a water bath or other means.

Working developers : For warm-brown tones use A, 14 parts; B, 1 part; C, 1 part. For blue-grey tones, use A, 12 parts; B, 3 parts; C, 1 part. For warm black tones, use A, 10 parts; B, 5 parts, C, 1 part.

Toning.

(1) For a fine brown tone, bleach in mercuric chloride solution (as used for intensification), wash and dry.

(2) Bleach in one of the following solutions, rinse, remove the bichromate stain with weak potass. metabisulphite solution, wash and dry.

A. Potass. bichromate	10 grs. (2.3 grms.)
Hydrochloric acid	5 drops (18 drops)
Water, to make	1 oz. (100 c.c.s.)
B. Potass. bichromate	10 grs. (2.3 grms.)
Potass. bromide	5 grs. (1.15 grms.)
Nitric acid ...	5 drops (18 drops)
Water, to make	1 oz. (100 c.c.s.)

C.—Same as above, save that potassium iodide is used in place of bromide.

On exposure to bright daylight, the bleached slide gradually darkens. A slide bleached in A tends to warm brown; one bleached in B becomes cool grey; and one bleached in C, brown in colour.

Dye-Toning.

Basic dyes may be used in the preparation of lantern slides in colour by treating the finished positive in the following mordanting bath (Eastman Kodak formula) :—

Uranium nitrate	14.6 grs. (1.6 grms.)
Oxalic acid ...	7.3 grs. (0.8 gm.)
Potass. ferri-cyanide	7.3 grs. (0.8 gm.)
Water, to make...	20 ozs. (1,000 c.c.s.)

The immersion should not be prolonged beyond the first perceptible turn towards brownness in tone, which with a new bath will appear in 1½-2 mins.

Wash until free from stain (10-15 mins.) and dye by immersion in a dye solution of :—

Dye ...	3.65 grs. (0.2 gm.)
Acetic acid, glacial	10 minims (0.5 c.c.)
Water, to make	40 ozs. (1,000 c.c.s.)

Suitable dyes are chrysoidine (brown), auramine (yellow), malachite green, victoria blue and methyl violet (the latter used in half the amount quoted).

Masking.

Prepare strips of black "needle" paper 3¼ ins. long and of various widths from ¼ in. to 1 in.

One edge at least must be perfectly clean cut.

Lay the slide, film side up, on white paper, moisten the surface of a suitable strip with the tongue and affix it on the slide so as to mask off to the desired margin.

A sheet of ruled paper laid under the slide helps in placing the strips squarely.

Apply other strips to the remaining three slides and trim off projecting edges with scissors.

Finally affix a white spot or disc on the two upper corners and proceed to the binding.

Binding.

Select a brand of binding strips of thin, tough paper, coated with strong adhesive, and use the strips in one full length ($13\frac{1}{4}$ ins.).

Lay the strip out, gummed side down and moisten the back.

When the strip is limp, turn it over, just moisten the gummed side and lay the strip, face up, on a yielding surface, *e.g.*, two thicknesses of blotting paper.



Fig. 1.

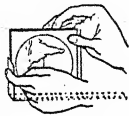


Fig. 2.

Cover the slide with a thin and carefully cleaned cover-glass, place one corner on the gummed strip (Fig. 1) and press it firmly down.

Turn the slide over on edge (Fig. 2) and over again (Fig. 3).



Fig. 3.

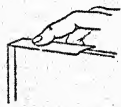


Fig. 4.

At each movement press the slide firmly down on the strip and run the finger *along the edge only* of the strip, to cause it to adhere to the slide (Fig. 4).

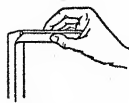


Fig. 5.

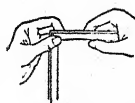


Fig. 6.



Fig. 7.



Fig. 8.

Now press the sides of the strip firmly against the glass, pushing the top end of the upright strip away from the glass (Fig. 5).

Then press down the corner to make a neat join (Fig. 6). Then turn the slide over once more into position (Fig. 7) and repeat operations 5 and 6.

Again turn, so as to join the ends of the binder, and repeat 5 and 6.

The slide completely bound in this way is seen in Fig. 8.

COLOUR PHOTOGRAPHY.

The following are the official working instructions for the screen plates on the market at the time of sending this portion of the ALMANAC to press (Nov. 15, 1932):—

Autochrome.

Plates and Films.

As a guide to exposure an average outdoor subject in midday summer sunshine requires about 1 sec. at $f/8$.

Ample exposure should always be given, as there is no remedy for under-exposure, whereas over-exposed plates can be easily intensified; in practice many workers prefer to over-expose plates and intensify them, as the results are more brilliant. The special filters supplied by Lumière must be used.

Two solutions only are used—developer (used also for re-development) and reversing solution. There is no need to fix.

In making the developer stock solution, dissolve the Quinomet in warm water (about 100° F.), add the sulphite, and then, when cold, the ammonia.

Working developer: Stock solution, 1 part; water, 4 parts.

Developer—Stock Solution.

A. Water, distilled	35 ozs. (1,000 c.c.s.)
Metoquinone ...	$\frac{1}{2}$ oz. (15 gms.)
(Quinomet)	
Soda sulphite, anhydrous	3 $\frac{1}{2}$ ozs. (100 gms.)
Liquor ammonia, .920	9 drs. (32 c.c.s.)
Potass. bromide	240 grs. (16 gms.)

For half-plate, place in developing dish the following solution:—

Stock solution A	1 oz.
above	(20 c.c.s.)
Water ...	4 ozs. (80 c.c.s.)

Place the plate therein, and count the number of seconds from the moment of entering until the appearance of the first outlines of the image (the sky should not be taken into consideration). As soon as the outlines appear, note the number of seconds, multiply it by 10 and you will get the total duration of development.

The development must begin

out of reach of the light of the lantern which must be fitted with Virida paper; but after 10-or 12 seconds, the plate may be rapidly examined.

Reversal of the Image

Following the development and after a short washing in running water, immerse the plate in a dish-containing 3 ozs. of the reversing solution and take the dish out in full light. The plate which was opaque, clears, and the colours become more and more visible by transmitted light. After half or one-and-a-half minutes, when the plate bears no more trace of negative image, take it out of the dish and wash it for about 30 seconds in running water.

REVERSING SOLUTION.

C. Potass. permanganate*	30 grs. (2 gms.)
Sulphuric acid	3 drams (10 c.c.s.)
Water...	35 ozs. (1,000 c.c.s.)

* Or Potass. bichromate.

This solution will keep for a short time, but should not be used if cloudy.

Immediately the plate is covered by the C solution daylight may be used.

Second Development.—The plate is then re-developed in full daylight, using the solution which has served for the first development (kept in the dish without special precautions). When the high-lights are completely darkened (about 3 or 4 minutes) the plate is washed for 3 or 4 minutes, and immediately placed to dry. Fixing is unnecessary unless the plate is intensified.

The Agfa Plate.

As a guide to exposure the plate may be given 30 times the exposure required by an extra-rapid ordinary plate of speed about 250 H. & D.

The plate is developed for 3 minutes at 65° F. (18° C.) in a developer made by mixing 1 part of the following stock solution A with 3 parts of water.

Stock Solution A.

Water, warm	...	20 ozs.	(1,000 c.c.s.)
Metol	...	114 grs.	(13 gms.)
Hydroquinone	...	35 grs.	(4 gms.)
Soda sulphite,		4 ozs.	
cryst	...	(200 gms.)	
Potass. bromide		48 grs.	(5.5 gms.)
Ammonia,	0.91	4 $\frac{1}{2}$ drams	
sp. gr.	...	(30 c.c.s.)	

In making this stock solution, the water should be at 86 to 95° F., and the chemicals must be dissolved in the order given. When all are dissolved, cool the solution to the temperature of the room before adding ammonia.

The working developer is used for the re-development, but must not be used again. The temperature of the working developer must not be higher than 65° F. If it is too warm, it is liable to cause softening and frilling of the film. With correct exposure, development is complete in 3 minutes.

Development having been completed, the plate is rinsed for about one minute (not longer) in running water, not under the tap. It is then put in the reversing bath.

Stock Solution for Reversing Bath.

Potass. bichromate	1 oz.	(50 gms.)
Sulphuric acid,		2 ozs.
strong	...	(100 c.c.s.)
Water	...	20 ozs.
		(1,000 c.c.s.)

One part of this stock solution is mixed with 10 parts of water to firm the reversing bath, which must not be warmer than 65° F. After one minute in this bath, the light may be turned on, and as soon as it is seen, by transmitted light, that the black silver image has been removed, the plate is taken out and at once put to wash for about 3 minutes in running water. It is then re-developed in strong light in the same developing solution as used in the first instance, and is then well rinsed and put aside to dry.

Desensitising.

Plates can be developed by bright red light if first immersed in the dark or by a safelight for 5 secs. in stock solution A, 20 parts; distilled water, 52 parts; Pinacryptol Yellow, 1:10,000 solution, 8 parts. Development is then continued in this same solution.

Finlay Colour Process.

This is a screen-plate process on the principle of the Joly process. The process was formerly known as the Paget, and at a later date was marketed under the name of Duplex. But the Finlay colour plate is a great advance in manufacture and allows of much shorter exposures than other known colour processes.

The exposure is made on a special Ilford panchromatic soft-gradation plate of 700 H. & D., which is placed in the dark slide behind the Finlay taking screen, with a Finlay compensating filter on the lens. The H. & D. speed of the plate, as exposed through the screen and compensating filter, is approximately 225, allowing of exposures of 1/50 sec. in bright sunshine at $f/4.5$. The panchromatic plate should be developed in any soft-working developer, such as metol. The following formula works well. When developed the plate is fixed in the usual way.

Metol One-Solution Developer.

Metol	150 grs. (17 gms.)
Soda sulphite	...	2½ ozs. (125 gms.)
cryst	...	3½ ozs. (175 gms.)
Potass bromide	...	16 grs. (1.8 gms.)
Water, hot	...	20 ozs. (1,000 c.c.s.)

For use, take equal parts of above stock solution and water.

Development is complete in 5 minutes at 65 deg. F.

In printing, a Finlay positive plate is placed in contact with the finished negative in an ordinary printing frame and exposed to a bare (not diffused) half-watt lamp. At 6 ft. from an ordinary 16 c.p. half-watt lamp, exposure is 5 secs. In developing the positive plate a more contrasty developer should be used, e.g. :—

A. Hydroquinone	...	100 grs. (11.5 gms.)
Soda sulphite	...	1 oz. (50 gms.)
cryst	...	20 ozs. (1,000 c.c.s.)

B. Caustic potash	...	100 grs. (11.5 gms.)
Water ...	...	20 ozs. (1,000 c.c.s.)

For use, take equal parts of A and B.

Development is complete in 2 minutes. Fix in the usual way.

When the positive plate is dry, it is brought into correct register with the Finlay viewing screen, the picture appearing in its correct colours. The two plates are then bound together.

Finlay Non-parallax Colour Screen.

This screen is a further refinement in the process, allowing of the making of colour transparencies which do not change colour according to the angle from which they are viewed.

The screens are coated with an emulsion of the gaslight kind and require to be handled by yellow or light-green light. In printing, the screen is registered with the negative as follows: The sensitive colour screen is placed emulsion side in contact with the negative, and, by means of the registering edges at each end of the negative, the negative and positive plate are gently moved until the colours are seen to be complementary when viewed by the printing light. The screen and negative are clipped together on all four sides with bull-dog clips, placed on a piece of black board (negative upwards) and exposed to a bare metal-filament half-watt bulb of 100 watts at about 3 ft. distance. With average negatives the exposure is about one minute. Under-exposure should be avoided.



EXPOSURE.

In all latitudes on roll-film.

The following tables, based on those of Burton, give a rough idea of the exposures for various subjects and stops with:

1. Best lighting, such as mid-day sunshine in May, June and July, in Northern Europe.
2. Sensitive material of the speed of *ordinary* roll-film (not the more recent "ultra-rapid.")

TABLE I.

F/ No.	Average Subject with objects in Fore-ground. Street Scenes. Outdoor Figure Studies.	Landscapes with Light Foreground, Lake, River and Beach Scenes.	Sea Clouds and Sky.	Subjects with Extra Heavy Foreground, e.g. Dark Trees, Doorways, Groups.	Under Trees, Woods, Avenues, Glades, etc.	Portrait in Average Well-lighted Room
<i>f</i> /2.7	1/500	1/1000	—	1/240	1/40	1/20
<i>f</i> /3.5	1/350	1/600	—	1/160	1/25	1/12
<i>f</i> /4	1/240	1/500	—	1/120	1/20	1/10
<i>f</i> /4.5	1/200	1/400	—	1/100	1/15	1/8
<i>f</i> /5.6	1/120	1/250	—	1/60	1/10	1/5
<i>f</i> /6.3	1/100	1/200	—	1/50	1/8	1/4
<i>f</i> /8	1/60	1/120	1/500	1/30	1/5	1/2
<i>f</i> /11	1/30	1/60	1/300	1/15	1/2	1
<i>f</i> /16	1/15	1/30	1/150	1/8	1	2

The exposures come between the full times which could be given with advantage and the minimum exposures required for a printable negative. The hand-camera user should not reduce them beyond a half, otherwise he will be undesirably near to getting negatives unprintable from under-exposure.

For exposures on the most rapid roll-film, film-packs and dry plates, from one-half to one-third the time in Table I. may be taken as a fair indication.

In weather other than bright sunshine the above exposures are multiplied as follows :—

Bright diffused light, the sun behind a cloud ...	} $\times 1\frac{1}{2}$	Heavy clouds over the whole sky. Absence of distinct shadows...	} $\times 3$
Light clouds over the whole sky, but light able to cast a visible shadow ...		Very dull. Whole sky covered by still heavier clouds ...	
	$\times 2$		$\times 4$ to 5

TABLE II.

Daily Variation in Light for different Latitudes.

At other hours of the day and times of the year the above exposures are multiplied by the numbers in Table II. of daylight variation. The figure 1 in Table II. indicates times for which Table I. suffices by itself. Table II. has been worked out for the ALMANAC by R. de B. Adamson, B.Sc., of Christchurch, N.Z.

[illegible]

TABLE II. (continued.)

Latitude.	North Hemisphere.	MORNING.								South Hemisphere	
		12	11	10	9	8	7	6	5		4
30°	June	$\frac{2}{3}$	$\frac{2}{3}$	1	1	$1\frac{1}{2}$	2	4	—	—	December.
	May, July	$\frac{2}{3}$	$\frac{2}{3}$	1	1	$1\frac{1}{2}$	2	6	—	—	Jan., Nov.
	April, Aug.	$\frac{2}{3}$	1	1	$1\frac{1}{2}$	$1\frac{1}{2}$	3	8	—	—	Feb., Oct.
	Mar., Sept.	1	1	1	$1\frac{1}{2}$	2	4	—	—	—	Mar., Sept.
	Feb., Oct.	1	1	$1\frac{1}{2}$	$1\frac{1}{2}$	3	6	—	—	—	April, Aug.
	Jan., Nov.	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	4	—	—	—	—	May, July.
	December	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	4	—	—	—	—	June.
1° 5	June	$\frac{2}{3}$	$\frac{2}{3}$	1	1	$1\frac{1}{2}$	3	8	—	—	December.
	May, July	$\frac{2}{3}$	$\frac{2}{3}$	1	1	$1\frac{1}{2}$	3	—	—	—	Jan., Nov.
	April, Aug.	$\frac{2}{3}$	$\frac{2}{3}$	1	1	$1\frac{1}{2}$	3	—	—	—	Feb., Oct.
	Mar., Sept.	$\frac{2}{3}$	$\frac{2}{3}$	1	$1\frac{1}{2}$	$1\frac{1}{2}$	3	—	—	—	Mar., Sept.
	Feb., Oct.	1	1	1	$1\frac{1}{2}$	2	4	—	—	—	April, Aug.
	Jan., Nov.	1	1	$1\frac{1}{2}$	$1\frac{1}{2}$	2	6	—	—	—	May, July.
	December	1	1	$1\frac{1}{2}$	$1\frac{1}{2}$	3	6	—	—	—	June.
0°	May, June	}	$\frac{2}{3}$	1	1	$1\frac{1}{2}$	2	4	—	—	May, June,
	July, Nov., Dec., Jan.		$\frac{2}{3}$	$\frac{2}{3}$	1	1	$1\frac{1}{2}$	3	—	—	July, Nov., Dec., Jan.
	Other months										Other months
		12	1	2	3	4	5	6	7	8	
AFTERNOON.											

AFTERNOON.

All the above factors are for atmospheric conditions as on a clear day in England. Extreme N. of Scotland, Lat. 60°; S. of Scotland, N. of England, N. of Ireland, Lat. 55°; S. of England, S. of Ireland, Lat. 50°.

Shutter Speeds for Moving Objects.

From the "Wellcome Exposure Record and Diary."

The following table on the next page gives in round figures the shutter speeds necessary for various moving objects, using the ordinary quarter plate lens of about 5 in. focus. The column A is for objects moving towards the operator, B for objects moving obliquely towards or from the camera, that marked C for objects moving directly across the field of view.

The table indicates the shutter speeds necessary to secure negatives sufficiently sharp for direct printing. For enlarging it is better to give $\frac{1}{2}$ to $\frac{1}{3}$ these exposures, or to work further from the object. *The figures are no guide to what is the correct exposure for the plate.*

Except where stated, objects are supposed to be 25 ft. from camera. If 50 ft. from camera, exposure may be double that at 25 ft.; if 100 ft., exposure may be double that at 50 ft.

Distance of Object, 25 ft., unless otherwise stated.	A.	B.	C.
Pedestrians (four miles per hour) ...	1/40	1/80	1/120
Vehicles (six miles per hour)...	1/60	1/120	1/180
Vehicles (eight miles per hour) ...	1/80	1/150	1/250
Cyclists and trotting horses ...	1/160	1/300	1/500
Foot races and sports... ..	1/240	1/500	1/700
Divers	—	1/600	1/800
Cycle races, horse galloping... ..	1/300	1/750	1/900
Yachts (10 knots) at 50 ft. ...	1/60	1/120	1/180
Steamers (20 knots) at 50 ft....	1/120	1/240	1/360
Trains (30 miles per hour) at 50 ft. ...	1/150	1/300	1/450
Trains (60 miles per hour) at 50 ft. ...	1/300	1/600	1/900

Scheiner & H. & D. Speed Nos.

In consequence of the great difference in the methods by which they are obtained, there is no regular equivalence between Scheiner and H. & D. speed numbers. The corresponding numbers in the following table must be regarded as only rough indications, applying, *in each case, to one and the same emulsion*. The error may be very much greater when the comparison is between the Scheiner number of one emulsion and the H. & D. emulsion of another. (See B.J., 1932, September 9, pp. 542-3.)

Scheiner No.	Relative Sensitivity.	H. & D. No.	Scheiner No.	Relative Sensitivity.	H. & D. No.
1	1.0	6	17	48.33	308
2	1.27	8	18	61.58	390
3	1.62	10	19	78.48	500
4	2.07	13	20	100	636
5	2.64	17	21	127	800
6	3.36	22	22	162	1050
7	4.28	27	23	207	1300
8	5.46	35	24	264	1700
9	6.95	45	25	336	2100
10	8.86	56	26	428	2700
11	11.29	72	27	546	3500
12	14.38	91	28	695	4400
13	18.33	117	29	886	5600
14	23.36	150	30	1130	7200
15	29.76	190	31	1440	9100
16	37.93	240	32	1830	11600

OPTICAL CALCULATIONS.

Finding Focal Length.

The focal length of a lens, may readily be found as follows : Focus carefully on some very distant object, such as a church spire, and mark the position of any convenient part of the moving lens front on the fixed baseboard of the camera. Then focus sharply on an object of known size, *e.g.*, a graduated rule, placed as close to the camera as the available bellows extension will permit. When this has been carefully focussed, mark the position of the part of the lens front previously chosen, and then photograph the object. After development measure the length of its image.

If L is the length of the object and l the length of its image on the plate and d the distance between the two marks made on the baseboard, then the focal length of the lens is given by $d \times L \div l$.

This method is theoretically sound and only requires care to give accurate results.

If there is available a camera of extension somewhat greater than twice the focal length which is to be measured a similar method may be used. In this case the procedure is to focus as before on a distant object, marking the position of any convenient part of the moving lens front on the fixed camera baseboard. Then any small object is focussed so that the image is exactly the same size as the object, and the baseboard again marked. The distance between the two marks is the focal length of the lens.

Focal Distances, etc.

Throughout the formulæ, on the next page, the following symbols are used as follows :—

f = the focal length or "focus" of the lens.

u = the distance of the *object* from the lens.

v = the distance of the *image* from the lens, *e.g.*, camera extension in copying, lens-easel distance in enlarging.

D = distance from object to image, neglecting nodal space, which in most lenses, is small compared with D .

R = number of times that the size (linear) of the object divides into that of the image, *i.e.*, No. of times of enlargement.

r = number of times that the size (linear) of the image divides into that of the object, *i.e.*, No. of times of reduction.

The distances u and v are reckoned respectively from the admission and exit nodes of a lens. For practical purposes (except with telephoto lenses) it is near enough to take these as situated at the diaphragm of a compound lens or at the surfaces of a single lens.

All the formulæ are derived from the parent formula :

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

which, in its various forms, allows of practically any calculation of image or object size, scale of enlargement or reduction, camera extension, etc., being readily made.

Scale of Reproduction. $R = \frac{\text{size of image}}{\text{size of object}}$ (linear) $r = \frac{\text{size of object}}{\text{size of image}}$ (linear) R is No. of times of enlargement. r is No. of times of reduction.

$$R = \frac{v}{u} \dots \dots \dots (1)$$

$$r = \frac{u}{v} \dots \dots \dots (5)$$

$$R = \frac{f}{u-f} \dots \dots \dots (2)$$

$$r = \frac{u-f}{f} = \frac{u}{f} - 1 \dots \dots (6)$$

$$R = \frac{v-f}{f} \dots \dots \dots (3)$$

$$r = \frac{f}{v-f} \dots \dots \dots (7)$$

$$R = \frac{D-2f}{f} \text{ (approx.) } \dots \dots (4)$$

$$r = \frac{D-2f}{f} \text{ (approx.) } \dots \dots (8)$$

Focal Length.

$$f = \frac{u \times R}{R+1} = \frac{u}{r+1} \dots \dots (9)$$

$$f = \frac{D \times R}{(R+1)^2} = \frac{D \times r}{(r+1)^2} \dots \dots (11)$$

$$f = \frac{v}{R+1} = \frac{v \times r}{r+1} \dots \dots (10)$$

$$f = \frac{D}{R+2} = \frac{D}{r+2} \text{ (approx.) } \dots \dots (12)$$

$$f = \frac{u \times v}{D} \dots \dots \dots (13)$$

Distance of Object from Lens.

$$u = \frac{v}{R} = v \times r \dots \dots \dots (14)$$

$$u = \frac{f \times v}{v-f} \dots \dots \dots (16)$$

$$u = \frac{f}{R} + f = (r+1) \times f \dots \dots (15)$$

$$u = \frac{D}{R+1} = \frac{r \times D}{r+1} \dots \dots (17)$$

Distance of Image from Lens.

$$v = u \times R = \frac{u}{r} \dots \dots \dots (18)$$

$$v = \frac{f \times u}{u-f} \dots \dots \dots (20)$$

$$v = (f \times R) + f = \frac{f}{r} + f \dots \dots (19)$$

$$v = \frac{R \times D}{R+1} = \frac{D}{r+1} \dots \dots (21)$$

Object-Image Distance.

$$D = f \times (R + \frac{1}{R} + 2) =$$

$$D = \frac{v \times (R+1)}{R} = v \times (r+1) \dots \dots (25)$$

$$f \times (r + \frac{1}{r} + 2) \dots \dots \dots (22)$$

$$D = u \times (R+1) =$$

$$= \frac{f \times (R+1)^2}{R} = \frac{f \times (r+1)^2}{r} \dots \dots (23)$$

$$= \frac{u \times (r+1)}{r} \dots \dots \dots (26)$$

$$= f \times (R+2) = f \times (r+2) \text{ (approx.) } \dots \dots (24)$$

Notes on the Formulæ.

No. 2.—If the distance u of an object is very great relatively to the focal length f , the latter becomes negligible relatively to u , so that the formula becomes

$R = \frac{f}{u}$ according to which the size of the image is directly proportional to f , and inversely proportional to u . While theoretically this is never so, the size of image is proportional (within an error of 1 per cent.) to the distance of the object if the distance of the object is at least 100 times the focal length of the lens. (See B.J., 1921, November 18, p. 686.)

Nos. 3, 7, 16.—When the distance u of the object is very great relatively to the focal length, the distance v of the image from the lens becomes nearly equal to f , and, in consequence of depth of focus, actually equal to f . In these circumstances corresponding with the photography of distant objects, Formulæ 3, 7 and 15 cease to apply.

Nos. 1, 2, 3, 5, 6, 7.—Bearing in mind the definitions of R and r these formulæ permit the calculation of the size of image obtained of an object of known size at a given distance with a lens of given focal length and, *vice versa*, the size of an object yielding an image of known size.

Nos. 4, 8, 12, 24.—These approximate formulæ yield results sufficiently near for practical purposes if R or r is greater than about 9 or 10.

No. 20.—If u is very great, compared with f , $u - f$ becomes practically equal to u , and therefore $v = f$.

Examples.

The following examples will serve to illustrate the use of those of the above formulæ which are chiefly employed for practical purposes:—

A picture 12×6 ft., 20 ft. from the lens is photographed with a 10 in. lens. What is the size of the copy? 12 ft. = 144 ins. 20 ft. = 240 ins. From *Formula 2*, $144 \times 10 \div (240 - 10) = 144 \times 10 \div 230 = 6.26$ ins. The copy therefore measures 6.26×3.13 ins.

Copying to Scale.

In making the copy of a painting on a scale of one-seventh, what focal length is required if the painting is 20 ft. distance. In *Formula 9*, $u = 20$ ft. $r = 7$. $r + 1 = 8$. The required focal length is therefore $20 \div 8 = 2\frac{1}{2}$ ft. = 30 ins.

Enlarging with Camera.

Camera has extension of 14 ins. What is greatest degree of enlargement that can be obtained when using 4-in. lens? $14 - 4 = 10$ in. $10 \div 4 = 2\frac{1}{2}$; that is, maximum enlargement is $2\frac{1}{2}$ times (*Formula 3*).

Maximum Focal Length.

In a camera for copying—enlarging up to 4 times, an extension of 30 ins. (lens to plate) can be obtained. What is the maximum focal length of lens which can be used? $4 + 1 = 5$. $30 \div 5 = 6$. (*Formula 10*.) Maximum focal length is 6 ins.

In copying originals half scale with camera of 9 ins. extension. what is maximum focal length of lens which can be used? $9 \times 2 = 18$. $18 \div 3 = 6$ ins. (*Formula 10*.) Focal length must not be greater than 6 ins.

Camera Extensions.

What is the required camera extension for copying $8\frac{1}{2} \times 6\frac{1}{2}$ ins. to $4\frac{1}{2} \times 3\frac{1}{2}$ ins. with a 12 in. lens? In *Formula 19*, reduction figure = 2. $12 \div 2 = 6$. $6 + 12 = 18$ ins.

What is the required camera extension when enlarging $4\frac{1}{2} \times 3\frac{1}{2}$ in. plate to $8\frac{1}{2} \times 6\frac{1}{2}$ ins. (= 2 times enlargement) with 12-in. lens? In *Formula 19*, $f = 12$; $R = 2$. $12 \times 2 = 24$. $24 + 12 = 36$ ins. = 3 ft.

Enlarging Space.

Enlargements up to 10 diameters are to be made with 8-in. lens. What space is required between negative and easel? In *Formula 23*, $R + 1 = 11$. $11 \times 11 = 121$. $121 \times 8 = 968$. $968 \div 10 = 96.8$ ins. = 8 ft. $\frac{3}{4}$ in.

Studio Space.

For making full-length cabinet portraits with 12-in. lens, what distance is required between sitter and focussing screen? If sitter is 70 ins. and figure is 5 ins. on negative, $r = 14$. In *Formula 23*, $r + 1 = 15$. $15 \times 15 = 225$ ins. $225 \times 12 = 2,700$. $2,700 \div 14 = 192\frac{1}{2}$ = 16 ft. $\frac{3}{4}$ ins.

Magnifiers.

When using a supplementary lens (magnifier) as a means of bringing near objects into focus when employing a camera fitted with a lens adjusted for use at fixed focus, the focal length of the supplementary lens must be equal to the distance of the object. This holds good whatever the focal length of the original lens.

Altering Focal Length.

The rule (very rough, on account of the impossibility of knowing from which part of a lens mount to measure) for finding the focal length of an extra lens, to reduce or increase the focal length of a given lens is as follows:—

Multiply the focal length to be altered by the final focal length desired, and divide the product by the original focal length less the final focal length.

$$\text{That is : } f_2 = \frac{f_1 \times F}{f_1 - F}$$

where f_1 is the original focal length,

F the final focal length required, and f_2 the focal length of the necessary added lens.

To increase the focal length, use a negative lens.

To reduce the focal length, use a positive lens.

Telephoto Rules.

F = equivalent focal length of complete lens.

f_1 = equivalent focal length of positive.

f_2 = equivalent focal length of negative.

E = camera extension, from negative lens to ground glass.

M = magnification, that is, number of times the image given by the complete lens is larger than that given by positive alone.

Magnification when working at given extension is found by dividing camera extension by

focal length of negative lens and adding 1.

$$M = \frac{E}{f_2} + 1.$$

Camera extension, necessary for given magnification,—multi-

ply focal length of negative lens by magnification less 1.

$$E = f_2 (M - 1).$$

Focal length of complete lens.—

Multiply focal length of positive by magnification.

Diaphragm Numbers.

EXPOSURES AT DIFFERENT APERTURES.

F. Numbers ...	1.8	2	2.2	2.5	2.7	2.9	3	3.16	3.4
Rel. Exposure Required—									
Fractions ...	2/3	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/2	
Decimal ...	0.83	1	1.33	1.66	2	2.33	2.66	3	
Seconds ...	1/1200	1/1000	1/750	1/600	1/500	1/428	1/375	1/325	

F. Numbers ...	3.5	3.9	4.5	5	5.6	6	6.3	8	
Rel. Exposure—		4							
Fractions ...	2 1/2	3	4	5	6	7	8	12	
Decimal ...	3.33	4	5.3	6.66	8	9.3	10.6	16	
Seconds ...	1/300	1/250	1/190	1/150	1/125	1/100	1/95	1/60	

The above table gives the relative exposures with lens apertures. The Fraction line gives a series of F/Nos. each requiring double the exposure of the preceding one. This series is F/2.2, 3.16, 4.5, 6.3. The Decimal line gives a similar series, beginning with $f/2$, viz., F/2, 2.7, 4, 5.6, 8. The last line gives the relative Speed of any lens, in comparison with another lens of different aperture.

EQUIVALENT F/- AND UNIFORM SYSTEM NUMBERS.

Rel. Exposure Req'd.	1	2	4	8	16	32	64	128
F. Nos. ...	4	5.6	8	11.3	16	22.6	32	45.2
U.S. Nos. ...	1	2	4	8	16	32	64	128

Among Continental opticians at the present time it is usual to adopt a different series of F/Nos. each requiring double the exposure of the preceding one. This series is:—

F/No.	3.16	4.5	6.3	9	12.5	18	25.3	36
-------	------	-----	-----	---	------	----	------	----

NOTE.—Most lenses are now marked with the F/numbers, according to one or other of the above two series, although the U.S. numbers are used on Kodak lenses. Also the actual diameter of the diaphragm aperture in millimetres is marked on some Continental lenses.

Extreme care in focussing at ordinary short distances is required if the hyperfocal distance exceeds 100 feet for scale focussing, or 200 feet for reflex work.

II. DEPTH FOR VARIOUS HYPERFOCAL DISTANCES.

Table constructed for a number of hyperfocal distances such that, if, with a lens corresponding with one of these hyperfocal distances, sharpest focus is secured on any of the distances given, then the limits of good definition are shown by the number before and the number after the distance focussed on.

Hyper-focal-Distances.	Distances focussed on in feet and decimals of a foot.
200	INF., 200, 100, 67, 50, 40, 33, 28.6, 25, 22.2, 20, 18.2, 16.7, 15.4, 14.3, 13.3, 12.5, 11.8, 11.1, 10.5, 10, 9.5, 9.1, 8.7, 8.3, 8, 7.7, 7.4, 7.1, 6.9, 6.7, 6.5, 6.3, 6.1, 5.9, 5.7, 5.55, 5.4, 5.25, 5.1, 5.
180	INF., 180, 90, 60, 45, 36, 30, 25.7, 22.5, 20, 18, 16.4, 15, 13.9, 12.9, 12, 11.2, 10.6, 10, 9.5, 9, 8.6, 8.2, 7.8, 7.5, 7.2, 6.9, 6.7, 6.4, 6.2, 6, 5.8, 5.6, 5.45, 5.3, 5.15, 5.
160	INF., 160, 80, 53, 40, 32, 26.7, 22.9, 20, 17.8, 16, 14.6, 13.3, 12.3, 11.4, 10.7, 10, 9.4, 8.9, 8.4, 8, 7.6, 7.3, 7, 6.7, 6.4, 6.15, 5.9, 5.7, 5.5, 5.3, 5.15, 5.
140	INF., 140, 70, 47, 35, 28, 23.3, 20, 17.5, 15.5, 14, 12.7, 11.7, 10.8, 10, 9.3, 8.75, 8.25, 7.8, 7.4, 7, 6.65, 6.35, 6.1, 5.8, 5.6, 5.4, 5.2, 5.
120	INF., 120, 60, 40, 30, 24, 20, 17.1, 15, 13.3, 12, 10.9, 10, 9.2, 8.6, 8, 7.5, 7, 6.7, 6.3, 6, 5.7, 5.5, 5.2, 5.
100	INF., 100, 50, 33, 25, 20, 16.7, 14.3, 12.5, 11.1, 10, 9.1, 8.3, 7.7, 7.1, 6.7, 6.3, 5.9, 5.55, 5.25, 5.
90	INF., 90, 45, 30, 22.5, 18, 15, 12.9, 11.2, 10, 9, 8.2, 7.5, 6.9, 6.4, 6, 5.6, 5.3, 5.
80	INF., 80, 40, 26.7, 20, 16, 13.3, 11.4, 10, 8.9, 8, 7.3, 6.7, 6.15, 5.7, 5.3, 5.
70	INF., 70, 35, 23.3, 17.5, 14, 11.7, 10, 8.75, 7.8, 7, 6.35, 5.8, 5.4, 5.
60	INF., 60, 30, 20, 15, 12, 10, 8.6, 7.5, 6.7, 6, 5.5, 5.
50	INF., 50, 25, 16.7, 12.5, 10, 8.3, 7.1, 6.3, 5.55, 5.
45	INF., 45, 22.5, 15, 11.2, 9, 7.5, 6.4, 5.6, 5.
40	INF., 40, 20, 13.3, 10, 8, 6.7, 5.7, 5.
35	INF., 35, 17.5, 11.7, 8.75, 7, 5.8, 5.
30	INF., 30, 15, 10, 7.5, 6, 5.
25	INF., 25, 12.5, 8.3, 6.3, 5.
20	INF., 20, 10, 6.7, 5.

NOTE.—The depth with a long-focus (including telephoto) lens is nearly as great as it would be with a short-focus lens of the same $f/\text{No.}$, if the latter were brought close enough to the object to give an image of the same size as that obtained with the long-focus lens.—R de B.A.

Focussing scales constructed on this plan for the hyperfocal distance with the lens at full aperture would be an enormous improvement. With the lens stopped down to an F/No. twice that at full aperture the limits of definition would be the second numbers above and below; to an F/No. four times that of full aperture, the fourth numbers above and below; and to an F/No. eight times that of full aperture, the eighth numbers above and below.

Lenses for Studios.

FOCAL LENGTHS OF LENSES FOR STUDIOS OF VARIOUS LENGTHS.

The following table shows the focus of lens which is suitable for comfortable working in studios of various lengths. In each case it is assumed that 5 ft. of the length will be taken up by camera, operator, sitter and background. The figures in column 1 are the full run of the studio, including this 5 ft. In the case of the short studios the focal lengths are about the longest which can be used: in the case of the longer studios somewhat greater focal lengths might be used, but the lenses directed in the table are about the best for general work.

Length of Studio. Feet.	C.D.V. full length. Inches.	C.D.V. half length and Cabinet full length. Inches.	C.D.V. head, Cabinet half length. Inches.	Cabinet head and Boudoir full length. Inches.	Boudoir half length, Panel full length. Inches.	Boudoir head, Panel half length. Inches.
12	4*	6½*	8½	9*	12*	14
14	4½*	7½*	9	10*	13*	16
16	5½	8½	10	10½	16	18
18	6	8½	10½	10½	16	18
20	6	10	10½	12	18	20
22	7	10½	12	14	22	22
24	8½	12	14	16	24	24
28	8½	13½	16	16	24	24
30	10	13½	16	18	24	24

* Full lengths may be obtained with these focal lengths, but the standpoint is so near to the sitter that good perspective cannot be expected.

Distances When Enlarging and Reducing.

Focus of Lens, inches	TIMES OF ENLARGEMENT AND REDUCTION.							
	1	2	3	4	5	6	7	8
	inches	inches	inches	inches	inches	inches	inches	inches
5½	11	16½	22	27½	33	38½	44	49½
	5½	8½	7½	6½	6½	6½	6½	6½
6	12	18	24	30	36	42	48	54
	12	9	8	7½	7½	7	6½	6½
7	14	21	28	35	42	49	56	63
	14	10½	9½	8½	8½	8½	8	7½
8	16	24	32	40	48	56	64	72
	16	12	10½	10	9½	9½	9½	9
9	18	27	36	45	54	63	72	81
	18	13½	12	11½	10½	10½	10½	10½
10	20	30	40	50	60	70	80	90
	20	15	13½	12½	12	11½	11½	11½
11	22	33	44	55	66	77	88	99
	22	16½	14½	13½	13½	12½	12½	12½

The table is used as follows :—Knowing the focal length of the lens to be used and the degree of (linear) enlargement or reduction, look up the figure for enlargement or reduction in the upper horizontal row, and carry the eye down the column below it until it reaches the horizontal line of figures opposite the focal length of lens in the left-hand column.

When *enlarging*, the greater of the two distances where the two lines join is the distance from lens to the sensitive paper or plate. The lesser is the distance from lens to negative, or picture being enlarged direct in camera.

When *reducing* the distances are *vice-versa* : the greater is the distance from lens to original, the smaller from lens to sensitive plate.

Amateur Cine Projection.

PROJECTION DISTANCES FROM PROJECTION LENS TO SCREEN.

Screen Size.	Distance required with		
	1 inch Lens.	1½ inch Lens.	2 inch Lens.
10" × 13"	3 ft.	4 ft.	6 ft.
16½" × 22"	5 ft.	6½ ft.	10 ft.
22" × 30"	6½ ft.	9 ft.	13½ ft.
30" × 40"	9 ft.	12 ft.	18 ft.
39" × 52"	11½ ft.	15½ ft.	23 ft.

Depth Table for Amateur Cine Cameras.

CALCULATED FOR A LENS OF 1 INCH (25 mm.) FOCUS AND A DISC OF CONFUSION OF 0.001 INCH.

Distance focussed on	f/1.9	f/2.8	f/3.5	f/4	f/5.6	f/8	f/11	f/16
100	30 - inf.	23 - inf.	19 - inf.	17 - inf.	13 - inf.	9 - inf.	7 - inf.	5 - inf.
50	23 - inf.	18 - inf.	16 - inf.	14 - inf.	11 - inf.	8½ - inf.	6½ - inf.	4½ - inf.
25	16 - 38	13½ - inf.	12 - inf.	11 - inf.	9½ - inf.	7½ - inf.	5½ - inf.	4½ - inf.
15	11 - 22	10 - 30	9 - 40	8 - 55	7½ - inf.	6 - inf.	5 - inf.	3½ - inf.
10	8 - 13	7½ - 15	7 - 17	6½ - 19	6 - 30	5 - inf.	4 - inf.	3½ - inf.
8	6½ - 10	6½ - 11	6 - 12	5½ - 13	5½ - 17	4½ - 36	3½ - inf.	3½ - inf.
6	5½ - 7	5 - 7½	4½ - 8	4½ - 8½	4½ - 10	3½ - 14	3½ - 31	2½ - inf.
4	3½ - 4½	3½ - 4½	3½ - 4½	3½ - 5	3 - 5½	2½ - 6½	2½ - 8½	2½ - 18
3	2' 10" - 3' 2"	2' 9" - 3' 4"	2' 8" - 3' 5"	2' 7" - 3' 6"	2' 6" - 3' 9"	2' 4" - 4' 6"	2' 0" - 5' 0"	1' 1" - 7
2	23" - 25"	22½" - 25½"	22" - 26"	21½" - 27"	21" - 28"	20" - 30"	19" - 33"	17" - 40"

Relative Exposures When Enlarging.

(Without a Condenser).

New Times of Enlarge- ment	Time of enlargement for which exposure is known.											
	1	1½	2	2½	3	3½	4	5	6	8	10	12
1	1	1½	2	2½	3	3½	4	5	6	8	10	12
1½	1½	1	1½	2	2½	3	3½	4	5	6	8	10
2	2	1½	1	1½	2	2½	3	3½	4	5	6	8
2½	2½	2	1½	1	1½	2	2½	3	3½	4	5	6
3	3	2	1½	1	1½	2	2½	3	3½	4	5	6
3½	3½	2½	2	1½	1	1½	2	2½	3	3½	4	5
4	4	3	2	1½	1	1½	2	2½	3	3½	4	5
5	5	4	3	2	1½	1	1½	2	2½	3	3½	4
6	6	5	4	3	2	1½	1	1½	2	2½	3	3½
8	8	6	5	4	3	2	1½	1	1½	2	2½	3
10	10	8	6	5	4	3	2	1½	1	1½	2	2½
12	12	9	7	6	5	4	3	2	1½	1	1½	2

To use this table find in the top horizontal line the number of times of enlargement for which exposure is known. Under this number the relative time of exposure for different degrees of enlargement will be found opposite the new times of enlargement in first vertical column.

Relative Exposures When Copying.

New Scales of Reduc- tion	Scale of reduction for which exposure is known.											
	1	¾	⅔	½	⅓	¼	⅕	⅙	⅓	⅔	¾	⅕
1	1	1½	1½	1½	2	2½	3	3	3	3½	3½	3½
1½	1½	1	1½	1½	2	2½	3	3	3	3½	3½	3½
2	2	1½	1	1½	2	2½	3	3	3	3½	3½	3½
2½	2½	2	1½	1½	2	2½	3	3	3	3½	3½	3½
3	3	2	1½	1½	2	2½	3	3	3	3½	3½	3½
3½	3½	2½	2	1½	2	2½	3	3	3	3½	3½	3½
4	4	2½	2	1½	2	2½	3	3	3	3½	3½	3½
5	5	3	2½	2	1½	2	2½	3	3	3½	3½	3½
6	6	3½	3	2½	2	1½	2	2½	3	3½	3½	3½
8	8	4½	4	3½	3	2½	2	1½	2	2½	3	3½
10	10	5½	5	4½	4	3½	3	2½	2	1½	2	2½
12	12	6½	6	5½	5	4½	4	3½	3	2½	2	1½

To use this table find in the top horizontal line the scale of reduction for which exposure is known. Under this scale the relative time of exposure for different degrees of reduction will be found opposite the new scales of reduction marked in first vertical column.

Table of Distances for Lantern Projection.

DISTANCE OF PROJECTION LENS FROM SCREEN, MASK BEING THREE INCHES.

Foci	4½	5	5½	6	7	8	9	10	11	12	14	15	16
Disc.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
5	7 10½	8 9	9 7½	10 6	12 3	14 0	15 9	17 6	19 3	21	24 6	26 3	28 0
6	9 4½	10 5	11 5½	12 6	14 7	16 8	18 9	20 10	22 11	25	29 2	31 3	33 4
7	10 10½	12 1	13 3½	14 6	16 11	19 4	21 9	24 2	26 7	29	33 10	36 3	38 8
8	12 4½	13 9	15 1½	16 6	19 3	22 0	24 9	27 6	30 3	33	38 6	41 3	44 0
9	13 10½	15 5	16 11½	18 6	21 7	24 8	27 9	30 10	33 11	37	43 2	46 3	49 4
10	15 4½	17 1	18 9½	20 6	23 11	27 4	30 9	34 2	37 7	41	47 10	51 3	54 8
11	16 10½	18 9	20 7½	22 6	26 3	30 0	33 9	37 6	41 3	45	52 6	56 3	60 0
12	18 4½	20 5	22 5½	24 6	28 7	32 8	36 9	40 10	44 11	49	57 2	61 3	65 4
13	19 10½	22 1	24 3½	26 6	30 11	35 4	39 9	44 2	48 7	53	61 10	66 3	70 8
14	21 4½	23 9	26 1½	28 6	33 3	38 0	42 9	47 6	52 3	57	66 6	71 3	76 0
15	22 10½	25 5	27 11½	30 6	35 7	40 8	45 9	50 10	55 11	61	71 2	76 3	81 4
16	24 4½	27 1	29 9½	32 6	37 11	43 4	48 9	54 2	59 7	65	75 10	81 3	86 8
18	27 4½	30 5	33 5½	36 6	42 7	48 8	54 9	60 10	66 11	73	85 2	91 3	97 4
20	30 4½	33 9	37 1½	40 6	47 3	54 0	60 9	67 6	74 3	81	94 6	101 3	108 0
25	37 10½	42 1	46 3½	50 6	58 11	67 4	75 9	84 2	92 7	101	117 10	126 3	134 8
30	45 4½	50 5	55 5½	60 6	70 7	80 8	90 9	100 10	110 11	121	141 2	151 3	161 4
35	52 10½	58 9	64 7½	70 6	82 3	94 0	105 9	117 6	129 3	141	164 6	176 3	188 0
40	60 4½	67 1	73 9½	80 6	93 11	107 4	120 9	134 2	147 7	161	187 10	201 3	214 8

WEIGHTS AND MEASURES.

Inches and Millimetres.

INCHES INTO MILLIMETRES.

MILLIMETRES INTO INCHES.

Inches.	Milli- metres.	Inches.	Milli- metres.	Milli- metres.	Inches.	Milli- metres.	Inches.
1	25.4	$\frac{3}{8}$	9.5	0.1	0.0039	13	0.51
$\frac{15}{16}$	23.8	$\frac{11}{32}$	8.7	0.5	0.015	14	0.55
$\frac{17}{16}$	23.0	$\frac{1}{8}$	7.9	1	0.04	15	0.59
$\frac{7}{8}$	22.2	$\frac{9}{32}$	7.1	2	0.08	16	0.63
				3	0.12	17	0.67
$\frac{13}{16}$	20.6	$\frac{1}{4}$	6.4	4	0.16	18	0.71
$\frac{3}{4}$	19.1	$\frac{7}{32}$	5.6	5	0.20	19	0.75
$\frac{11}{16}$	17.5	$\frac{3}{16}$	4.8	6	0.24	20	0.79
				7	0.28	21	0.83
$\frac{5}{8}$	15.9	$\frac{1}{8}$	3.2	8	0.31	22	0.87
$\frac{9}{16}$	14.3	$\frac{5}{32}$	2.4	9	0.35	23	0.90
$\frac{5}{8}$	12.7	$\frac{1}{8}$	1.6	10	0.39	24	0.94
$\frac{7}{16}$	11.1	$\frac{3}{32}$	0.8	11	0.43	25	0.98
				12	0.47	25.4	1.0

English Sizes of Plates.

Inches.	Cm.	Inches.	Cm.
$3\frac{1}{2} \times 2\frac{1}{2}$	8.9 × 6.4	7 × 5	17.8 × 12.7
$3\frac{1}{4} \times 3\frac{1}{4}$	8.25 × 8.25	$8\frac{1}{2} \times 6\frac{1}{2}$	21.5 × 16.5
$4\frac{1}{4} \times 3\frac{1}{4}$	10.8 × 8.25	10 × 8	25.4 × 20.3
5 × 4	12.7 × 10.1	12 × 10	30.4 × 25.4
$6\frac{1}{2} \times 4\frac{1}{2}$	16.5 × 12.0	15 × 12	38.1 × 30.4

Continental Sizes of Plates (or Roll-film or Film-pack).

Cm.	Inches.	Cm.	Inches.
3 × 4	$1\frac{1}{2} \times 1\frac{1}{4}$	10 × 15	3.92 × 5.9
4.5 × 6.0	$1\frac{3}{4} \times 2\frac{3}{8}$	12 × 16	4.72 × 6.30
6 × 9	$3\frac{1}{4} \times 2\frac{1}{4}$	13 × 18	5.12 × 7.08
9 × 12	$3\frac{1}{2} \times 4\frac{3}{4}$	18 × 24	7.08 × 9.44

Sizes of Lantern Slides (Various Countries).

The standard size of English lantern slides is $3\frac{1}{4} \times 3\frac{1}{4}$ inches. The standard French size for lantern slides is 85×100 mm. (the longer side horizontal). The American size is 4 (base) $\times 3\frac{1}{4}$ (height) inches, though some makers use $4\frac{1}{4} \times 3\frac{1}{4}$ inches.

British Weights and Measures.

The formulæ in the editorial pages of this ALMANAC are given, in almost all cases, in both British and metric measures, and in adopting this course we have had the desire to impress upon photographers the simplicity and facility of the latter system. As a rule, the British formulæ are expressed in grains or ounces per 20 ozs. of solution, and the metric formulæ in grammes per 1000 c.c.s. In regard to the total bulk of solution, our formulæ are mostly drawn up on the basis that the total bulk after the solution of the solids is that stated in the formula—20 ozs. or 1000 c.c.s. as a rule.

What are Percentage Solutions ?

The usual practice in making a solution to a specified percentage strength is to consider the weight of the substance to be dissolved in relation to the volume of the completed solution. Thus, to make a 10 per cent. solution, we dissolve 1 ounce avoirdupois in enough water to make the volume of the solution 10 fluid ounces. If, however, the object is to make a solution of which some sub-division of a fluid ounce will contain a grain or an exact number of grains, then the number of minims or drachms of the completed solution must be an exact multiple of the number of grains dissolved. Thus if 1 oz. Av. of 437.5 grains be dissolved in enough water to make the volume of the solution 4,375 minims (approximately 9 ozs. 1 drachm) every 10 minims of the solution will contain 1 grain of the substance.

Formulæ Stated in Parts.

Formulæ given, as many are, in "parts," may be made up by writing gms. for the solid and c.c.s. for the fluid "parts," and converting them into the British measures by any of the tables in this section. Thus: Pyro, 10 parts; sodium sulphite 100 parts; water, 1000 parts, becomes Pyro, 154 grs.; sodium sulphite, 3 ozs. 230 grs.; water, 35 ozs.

1. APOTHECARIES WEIGHT.

20 Grains	=	1 Scruple.
3 Scruples	=	1 Drachm = 60 Grains.
8 Drachms	=	1 Ounce = 480 Grains.

It is now customary in formulæ to employ the avoirdupois ounce ($437\frac{1}{2}$ grains), but where "drachms" are given the apothecaries drachm of 60 grains is meant.

2. AVOIRDUPOIS WEIGHT.

437½ Grains	= 1 Ounce.
16 Ounces	= 1 Pound = 7,000 Grains.
¼ ounce = 109 grains ; ½ ounce = 219 grains ; ¾ ounce = 328 grains.	

3. FLUID MEASURE.

60 Minims	= 1 Drachm.
8 Drachms	= 1 Ounce = 480 Minims.
20 Ounces	= 1 Pint = 160 Drachms = 9,600 Minims.
2 Pints	= 1 Quart = 40 Ounces = 320 Drachms.
4 Quarts	= 1 Gallon = 160 Ounces = 1,280 Drachms.
1 fluid ounce of water weighs 437½ grains, therefore every minim weighs 0·91 grain.	

In the United States the pint is of 16 ozs., the quart of 32 ozs., and the gallon of 128 ozs.

Metric Weights and Measures.

The unit of weight is the gramme, written "gm."; the subdivisions are the "deci-" (1/10th), "centi-" (1/100th), and "milligramme" (1/1,000th); the multiples are the "deka-" (10 gm.) and "hectogramme" (100 gm.), but in practice it is usual to write these quantities as : 0·1 or 0·01 and 10 or 100 grammes, and the abbreviation "kilo." for 1,000 gms.

The following are the equivalents of Metric Weights and Measures in terms of Imperial Weights and Measures :—

LINEAR MEASURE.

1 Millimetre (mm.) (1/1,000th M.)	=	0·03937 inch.
1 Centimetre (1/100th M.)	...	= 0·3937 "
1 Metre (M.)	...	= { 39·370113 inches.
		{ 3·280843 feet.
		{ 1·0936143 yard.
Kilometre (1,000 M.)	...	= 0·62137 mile.

SQUARE MEASURE.

1 Square Centimetre	...	=	155 square inch.
1 Square Metre (100 square decimetres)	...	=	{ 10·7639 square feet.
			{ 1·196 square yards.

WEIGHT.

Avoirdupois.

1 Milligramme (1/1,000th gm.)	=	0·015 grain.
1 Gramme (1 gm.)	...	= 15·432 "
1 Kilogramme (1,000 gm.)	...	= { 2·2046223 lbs. or
		{ 35·273957 ozs.

FLUID MEASURE.

1 Cubic centimetre (c.c.) (1/1,000th litre)	= 16·9 minims.
1 Litre (1 L.)	= 35 ozs. 94 m. = 16894·1 minims.

Grammes Into Grains and Ounces (Avoirdupois).

Gms.	Ozs.	Grs.	Gms.	Ozs.	Grs.	Gms.	Ozs.	Grs.
0.1		1.5	16	$\frac{1}{2}$	28.1	130	$4\frac{1}{2}$	37
0.2		3.1	17	$\frac{1}{2}$	43.5	140	$4\frac{3}{4}$	82
0.3		4.6	18	$\frac{1}{2}$	59.0	150	$5\frac{1}{4}$	18
0.4		6.2	19	$\frac{1}{2}$	74.4	160	$5\frac{3}{4}$	61
0.5		7.7	20	$\frac{1}{2}$	89.8	170	6	0
0.6		9.1	25	$\frac{1}{2}$	57.0	175	6	76
0.7		10.8	30	1	25	180	$6\frac{1}{2}$	44
0.8		12.4	35	1	103	190	$6\frac{3}{4}$	88
0.9		13.9	40	$1\frac{1}{4}$	71	200	7	24
1		15.4	45	$1\frac{1}{2}$	38	250	$8\frac{3}{4}$	32
2		30.9	50	$1\frac{3}{4}$	6	300	$10\frac{3}{4}$	31
3		46.3	55	$1\frac{3}{4}$	83	350	$12\frac{1}{4}$	41
4		61.7	60	2	51	400	14	50
5		77.2	65	$2\frac{1}{4}$	19	450	$15\frac{3}{4}$	52
6		92.6	70	$2\frac{1}{4}$	94	500	$17\frac{3}{4}$	61
7		108.0	75	$2\frac{3}{4}$	64	550	$19\frac{1}{4}$	66
8	$\frac{1}{4}$	14.1	80	$2\frac{3}{4}$	32	600	21	70
9	$\frac{1}{4}$	29.5	85	3	0	650	$22\frac{3}{4}$	72
10	$\frac{1}{4}$	44.9	90	3	76	700	$24\frac{1}{4}$	81
11	$\frac{1}{4}$	60.4	95	$3\frac{1}{4}$	44	750	$26\frac{1}{4}$	90
12	$\frac{1}{4}$	75.8	100	$3\frac{1}{2}$	11	800	28	95
13	$\frac{1}{4}$	91.2	110	$3\frac{3}{4}$	56	850	$29\frac{3}{4}$	102
14	$\frac{1}{2}$	106.7	120	4	102	900	$31\frac{1}{2}$	106
15	$\frac{1}{2}$	12.7	125	$4\frac{1}{4}$	70	1,000	$35\frac{1}{4}$	11

Number of Grains in Ozs. (Avoirdupois).

In making calculations the following equivalents of ounces and quarter-ounces in grains will be found useful :—

$\frac{1}{4}$ oz. = 109 grs.	$2\frac{1}{4}$ ozs. = 984 grs.	$4\frac{1}{4}$ ozs. = 1,859 grs.
$\frac{1}{2}$ oz. = 219 grs.	$2\frac{1}{2}$ ozs. = 1,094 grs.	$4\frac{3}{4}$ ozs. = 1,969 grs.
$\frac{3}{4}$ oz. = 328 grs.	$2\frac{3}{4}$ ozs. = 1,203 grs.	$4\frac{3}{4}$ ozs. = 2,078 grs.
1 oz. = 437 grs.	3 ozs. = 1,312 grs.	$5\frac{1}{4}$ ozs. = 2,296 grs.
$1\frac{1}{4}$ oz. = 546 grs.	$3\frac{1}{4}$ ozs. = 1,421 grs.	$5\frac{3}{4}$ ozs. = 2,406 grs.
$1\frac{1}{2}$ oz. = 656 grs.	$3\frac{1}{2}$ ozs. = 1,531 grs.	6 ozs. = 2,625 grs.
$1\frac{3}{4}$ oz. = 765 grs.	$3\frac{3}{4}$ ozs. = 1,640 grs.	$6\frac{1}{4}$ ozs. = 2,734 grs.
2 ozs. = 875 grs.	4 ozs. = 1,750 grs.	$6\frac{3}{4}$ ozs. = 2,844 grs.

Grms. per Litre to Grs. per 20 ozs.

Gms. per litre.	Grs. per 20 ozs.	Gms. per litre.	Grs. per 20 ozs.	Gms. per litre.	Grs. per 20 ozs.	Gms. per litre.	Grs. per 20 ozs.
0.1	$7\frac{1}{8}$	1	$8\frac{3}{4}$	10	88	55	482
0.2	$1\frac{1}{2}$	2	$17\frac{1}{2}$	15	131	60	526
0.3	$2\frac{1}{8}$	3	26	20	175	65	570
0.4	$3\frac{1}{8}$	4	35	25	219	70	613
0.5	$4\frac{1}{8}$	5	44	30	263	75	657
0.6	$5\frac{1}{8}$	6	53	35	307	80	701
0.7	6	7	61	40	351	85	745
0.8	7	8	70	45	394	90	789
0.9	8	9	79	50	438	95	833

**Conversion of British into Metric Measures.
Grains into Grammes.**

Grs.	Gms.	Grs.	Gms.	Grs.	Gms.
1	0.065	16	1.037	35	2.268
2	0.13	17	1.102	40	2.592
3	0.194	18	1.166	45	2.916
4	0.259	19	1.232	50	3.240
5	0.324	20	1.296	55	3.564
6	0.389	21	1.361	60	3.888
7	0.454	22	1.426	65	4.212
8	0.518	23	1.490	70	4.536
9	0.583	24	1.555	75	4.860
10	0.648	25	1.620	80	5.184
11	0.713	26	1.685	85	5.508
12	0.775	27	1.750	90	5.832
13	0.842	28	1.814	95	6.156
14	0.907	29	1.880	100	6.480
15	0.972	30	1.944		

Ounces (Avoirdupois) to Grammes.

Ozs.	Gms.	Ozs.	Gms.	Ozs.	Gms.
$\frac{1}{4}$	7.09	4	113.40	13	368.54
$\frac{1}{2}$	14.17	5	141.75	14	396.89
$\frac{3}{4}$	21.26	6	170.10	15	425.24
1	28.35	7	198.45	16	453.59
$1\frac{1}{4}$	42.5	8	226.80	17	481.94
2	56.70	9	255.15	18	510.29
$2\frac{1}{2}$	70.87	11	311.8	19	538.64
3	85.05	12	340.19	20	566.99

C.c.s. to Minims and Ozs.—It is near enough to use the table on page 396, reckoning gms. as c.c.s. and grains as minims. Example, 35 c.c.s. equal 1 oz. (fluid) + 103 minims.

Conversion Rules—Gms. per litre into grains per oz.—Multiply the grammes by 0.44.

C.c.s. per litre into minims per ounce.—Divide the c.c.s. by 2 (more exactly, multiply by 0.48).

Grains per ounce into grammes per litre.—Multiply the grains by 2.2. Thus 50 grs. per oz. = 115 gms. per litre.

Minims per ounce into c.c.s. per litre.—Multiply the minims by 2.

Tables in Past Almanacs.

The following is a list of tables which have appeared in past issues of the 'Almanac,' but are not included among those in the present volume.

The reference in brackets after each is to the most recent issue of the "Almanac" in which the table has appeared; in most cases it will be found included for several years prior to the date of this reference.

CHEMICAL.

Simplification of Emulsion Calculations (Equivalence of Alkaline Haloid Salts). (1903, p. 1160.)

Solubility of the Silver Haloids.—Valenta. (1907, p. 1109.)

Freezing Mixtures. (1907, p. 1116.)

Developing Equivalence of the Alkalis. (1903, p. 1159.)

Chemical Reactions of the known Developing Agents (Tests of Developers). (1904, p. 1010.)

Pyro Developers recommended for various Plates by Makers. (1890, p. 666.)

Tables of Developers (in grains per oz.) for various Commercial Plates. (1912, p. 761.)

Formulae of Chemicals. (1924, p. 483.)

Solubilities of Chemicals. (1924, p. 489.)

Poisons and Antidotes. (1927, p. 449.)

LIGHT AND EXPOSURE.

Variation in the Sun's Position at Different Seasons of the Year.—J. A. C. Branfl. (1903, p. 1176.)

Points of the Compass at which the Sun rises for London, Edinburgh and Dublin. (1869, p. 147.)

Sun's Altitude for various Latitudes. (1898, p. 1063.)

Exposure and Lens Aperture. (1910, p. 893.)

Actinograph Exposure Table. (1901, p. 702.)

Comparative Exposures.—W. K. Burton (1887, p. 341.)

Comparative Plate-Speed Numbers. (1912, p. 897.)

ORTHOCHROMATIC.

Speeds and Colour Sensitiveness of various Plates to Different Lights.—Eder. (1907, p. 1115.)

Wave-Lengths of the Principal Fraunhofer Spectrum Lines, and the Elements that give them. (1905, p. 1144.)

Reflection of Light from various Surfaces. (1900, p. 1016.)

OPTICAL.

Equations relating to Foci, etc.—Branfl. (1907, p. 1120.)

Combining Lenses.—Formulae. (1910, p. 893.)

Perspective.—Factors. (1910, p. 895.)
Correction of Convergent Distortion.—Formulae. (1910, p. 896.)

Scale of Image. (1910, p. 893.)

Conjugate Foci. (1910, p. 892.)

Royal Photographic Society's Standard Diaphragms. (1903, p. 1178; 1905, p. 1149 and 1907, p. 1083.)

Uniform System Numbers for Stops from f/1 to f/100. (1905, p. 1147.)

Continental Stops and their U.S. Equivalents. (1907, p. 1127.)

Correction for Inconstancy of Aperture. (1910, p. 895.)

Angles and Foci of the Telephoto Lens. (1894, p. 949.)

Steinheil's Tables of Camera Extensions, etc., corresponding to a given Magnification of the Telephoto Lens. (1902, p. 732.)

Focussing with Pinhole Apertures. (1896, p. 954.)

Aperture Markings of Old Lenses. (1927, p. 457.)

View Angles. (1927, p. 458—459.)

CHEMICALS.

Properties of Chief Chemicals Used in Photography.

On these pages are given particulars of just those chemicals which are used in everyday photography, with those of a few others not so regularly employed. The facts here collected are those which it is useful to know for the proper making-up of solutions: and they also enable photographers unacquainted with chemistry to identify chemicals by their different names.

Acetic Acid ($C_2H_4O_2$).—Sold as "glacial," which is the strength to be used in formulæ unless otherwise directed. The glacial acid is a liquid of sp. gr. 1.055, which strongly blisters the skin. At 50 deg. F. it solidifies to a mass of crystals. Thus in cold weather it may be necessary to melt the contents of a bottle of the acid before use by standing the bottle in warm water. Glacial acid absorbs water strongly from the air and must be kept well stoppered. It mixes in all proportions with water, alcohol, ether, chloroform and glycerine, and dissolves gelatine, celluloid, fat, oils, etc. In United States a No. 8 acid of 1.040 sp. gr. is commonly prescribed in formulæ, it is of 31 per cent. strength, *i.e.*, about one-third the strength of the glacial acid.

Albumen.—One of the protein colloid substances which largely compose living tissue, animal and vegetable. Contains nitrogen, sulphur, oxygen, carbon and hydrogen. The typical albumen occurs in white of egg, which is the only animal albumen having any photographic use. Egg albumen is soluble in water and dilute solutions of alkalis and salts. Heated to

about 163° F. it is irreversibly coagulated, becoming then amorphous and insoluble. The same effect is produced by strong alcohol, and by most metallic salts. The solution of egg-albumen is extremely liable to decompose and, if not used at once, requires to be preserved with an antiseptic. Invert albumen, which is soluble in alcohol, is prepared from egg albumen by treating first with acid and then alkali. Its use is now limited to process work, owing to the disuse of albumenised paper and of the albumen processes.

Alcohol.—Ordinary alcohol is ethyl alcohol (C_2H_5OH) which, when of sp. gr. 0.794, is "absolute alcohol" (=100 per cent.). Alcohol containing 10 per cent. water is "rectified spirit." Methylated spirit consists of rectified spirit plus 10 per cent. crude wood spirit (to render it undrinkable) and one-eighth per cent. mineral naphtha. The naphtha appears as a milkiness when the spirit is mixed with water. Methylated spirit which has taken up water, *e.g.*, from wet negatives or prints, can be largely dried by shaking with dry potassium carbonate. The latter takes up the water

which forms a dense solution of it. The partially dried spirit, which takes up about 0.1 per cent. of the potass carbonate, can afterwards be poured off.

Alum.—Double sulphate of aluminium and potassium (or ammonium), i.e. potash alum or ammonia alum $[\text{Al}_2 (\text{SO}_4)_3 \text{K}_2 \text{SO}_4 \cdot 24\text{H}_2\text{O}$ or $\text{Al}_2 (\text{SO}_4)_3 (\text{NH}_4)_2 \text{SO}_4 \cdot 24\text{H}_2\text{O}]$. Potash alum is made in large white crystals, but is more conveniently dissolved if bought in powder form. One part will dissolve in ten parts of cold water; in very much less hot water, which therefore should be used when making a stock solution. Ammonia alum is not quite so soluble. Both alums dissolve in glycerine. Both are acid substances, decomposing hypo, with deposition of sulphur. Alum for photographic use should be free from iron, the presence of traces of which is liable to give rise to bluish stains in sulphide-toned prints which have been hardened in a bath containing such impure alum.

Amidol, i.e., diamidophenol hydrochloride of $\text{C}_6 \text{H}_3 \text{OH} (\text{NH}_2)_2$. Fine white or bluish grey crystals, very soluble in water, but almost insoluble in alcohol. The solution is acid; addition of soda carbonate produces effervescence. Amidol in the dry state is slowly affected by air and light and should be kept in well stoppered yellow bottles. The solution (with sulphite) for development keeps only a short time, i.e., should be used on the day it is made.

Ammonia, i.e., liquor ammonia, strong solution in water of the gas NH_3 . Ammonia is sold as of sp. gr. 0.880, i.e., strongest liquor ammonia, but is often of somewhat less

strength. The strong solution rapidly loses strength by exposure to the air. When purchasing a few ounces, it is well to mix with an equal bulk of water, using a double quantity of this half strength mixture in making up any formulae. Full or half strength ammonia solutions should be kept in a cool place.

Ammonium bichromate $(\text{NH}_4)_2 \text{Cr}_2\text{O}_7$.—Orange crystals, formed by neutralising chromic acid with ammonia. More soluble than the potash salt, one part dissolving in four parts of cold water; far more soluble in warm water, and fairly soluble in absolute alcohol. It can replace potass bichromate in the sensitising of gelatine in the carbon, carbro, and oil processes, and is frequently used in preference on account of its stronger action. It is also largely used for sensitising in photo-mechanical process work, particularly in the making of half-tone images on zinc and copper by sensitised fish-glue.

Ammonium bromide, i.e., bromide of ammonia, NH_4Br . White crystalline powder dissolving in $1\frac{1}{2}$ times its weight of cold water; slightly soluble in alcohol. It becomes moist by exposure to the air and should be kept well stoppered.

Ammonium carbonate, i.e., carbonate of ammonia, rock ammonia. A mixture of ammonium bicarbonate and ammonium carbamate, sold in hard opaque pieces, smelling strongly of ammonia. Any white powdery crust on the pieces should be scraped off before using. Dissolves in about four times its weight of cold water; should not be dissolved in hot water.

Ammonium chloride, NH_4Cl . A commercial quality is the sal ammoniac sold for batteries. One part dissolves in three parts of cold water; in $1\frac{1}{2}$ parts hot water.

Ammonium persulphate, $(\text{NH}_4)_2\text{S}_2\text{O}_8$. Small white crystals, dissolving in $1\frac{1}{2}$ times their weight of cold water. Decomposed by hot water. Persulphate greedily absorbs moisture from the air and must be kept in a well stoppered bottle.

Ammonium sulphide.—Sold as deep yellow liquid smelling strongly of rotten eggs. Contains traces of other sulpho compounds with the ammonium sulphide $(\text{NH}_4)_2\text{S}$.

Ammonium sulphocyanide, i.e., ammonium thiocyanate, sometimes called ammonium sulphocyanate, NH_4CNS . Small white crystals which absorb moisture with great avidity, becoming wet if not well stoppered. Sulphocyanide, which has deteriorated in this manner, should be thrown away; it cannot be dried by heat. The crystals are exceedingly soluble in water and in alcohol.

Borax, i.e., borate of soda, $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$. Pure white crystalline powder, one part of which dissolves in $12\frac{1}{2}$ parts of cold water—but very much more readily in hot water. Solutions of borax in water are slightly alkaline.

Bromine, heavy deep red and intensely corrosive liquid, emitting dense orange fumes, extremely irritating to the eyes. It is the element Br, analogous to iodine. Bromine dissolves in about 30 times its weight of water, forming an orange red solution, which also gives off irritating fumes. In any use of

bromine it is best to buy it as this "bromine water." Further diluted, this latter forms an excellent bleach for sulphide toning.

Calcium chloride, CaCl_2 .—The commercial fused form of this substance is the most active absorbent of moisture, for which purpose, in admixture with asbestos, it is used for preserving platinotype paper in a dry condition. An ample supply of the dried chloride can be used with advantage in containers (preferably metal boxes) of sensitive papers or plates. The lumps of chloride may be put in a holder of perforated zinc, of size sufficient for several pounds. When it becomes visibly damp, the chloride can be restored to its original condition by heating it in an iron shovel over the fire.

Caustic potash, i.e., potash hydrate, potash hydroxide, K H O . The "strongest" form of alkali, having a powerful corrosive action on the skin. It is usually sold in sticks which quickly become moist to the touch by absorbing water from the air and also in time become encrusted with a powdery deposit due to the formation of carbonate by absorption of carbon dioxide. Caustic potash must be kept in a well corked bottle, not glass stoppered, since the potash acts on the glass and causes the stopper to stick. For the same reason solutions of caustic potash should be rubber-stoppered. A purer form of caustic potash, very suitable for photographic use, is that known as "by alcohol"; the potash is in pieces of fibrous structure. Caustic potash dissolves readily in half its weight of cold water with production of much heat.

A solution quickly cleans greasy bottles; it softens gelatine a weak hot bath being used for the wholesale removal of the films from waste negatives.

Caustic soda, *i.e.*, sodium hydrate, sodium hydroxide, NaHO . Except that it is a somewhat less "powerful" alkali and is not so readily soluble in water, caustic soda is similar to caustic potash. It is supplied in the same two forms, stick and "by alcohol" and calls for the same precautions in keeping it in the solid state and in solution.

Chrome alum, double sulphate of chromium and potassium, $\text{Cr}_2 \text{K}_2 (\text{SO}_4)_4 \cdot 24\text{H}_2 \text{O}$. Violet crystals which are ruby red by transmitted light. Dissolves in about six times its weight of cold water. Hot water should not be used for dissolving it. Chrome alum toughens gelatine somewhat more energetically than do the ordinary white alums, and its tanning action is further increased by addition of a few drops of ammonia, sufficient to render the solution slightly alkaline.

Citric Acid, small colourless crystals which have the formula $\text{C}_6 \text{H}_8 \text{O}_7 \cdot \text{H}_2 \text{O}$. Extremely soluble in water; slightly soluble in alcohol. Solutions of citric acid in plain water gradually spoil through growth of a mould. This can be prevented by addition of a few drops of carbolic acid.

Copper sulphate, sulphate of copper, blue vitriol, $\text{CuSO}_4 \cdot 5\text{H}_2 \text{O}$. Blue crystals which dissolve in $2\frac{1}{2}$ times their weight of cold water; half their weight of hot water; insoluble in alcohol. For its chief photographic use, namely copper toning, the pure sulphate should

be used commercial sulphate often contains iron. Should be kept well corked to prevent formation of a bluish-green incrustation.

Dextrine, fine powder, which for use as a mountant, should be the pure white quality; the yellow is less suitable. Simply dissolved in a little water, dextrine forms a highly adhesive syrup but is best prepared by heating it with about $1\frac{1}{2}$ times its weight of water to 160 deg. F. and setting it aside in a cool place for the mixture to congeal to a firm smooth paste.

Ferric ammonium citrate, double citrate of iron and ammonia. It is obtainable in two forms—(1) brown scales, from any chemist; and (2) fine green crystals from large dealers in chemicals. The green citrate is much more sensitive to light than the brown and is now almost always used in the preparation of sensitive iron-printing papers.

Ferrous oxalate, the active substance $\text{FeC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ of the ferrous oxalate developer. It is itself almost insoluble in water, but is freely soluble in solution of potass oxalate. It is thus formed in solution by mixing solutions of ferrous sulphate and potass oxalate.

Ferrous sulphate, sulphate of iron, proto-sulphate of iron, green vitriol, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$. Should be in clear emerald green crystals, free from reddish markings. Slowly oxidises in the air and must be kept well stoppered. One part dissolves in about $1\frac{1}{2}$ parts of cold water, forming a green solution which also gradually oxidises, becoming more yellowish in tint and slightly turbid. This change can be prevented by making the

solution acid with a little sulphuric or tartaric acid, and by keeping a few pieces of iron wire in the mixture. Also the solutions keep better in bright light.

Formaline, 40 per cent. solution of formaldehyde, $C H_2 O$. The solution has a characteristic penetrating odour, causing the eyes to water. It mixes with water in all proportions and is slightly acid.

Gelatine is not a definite chemical compound, but a mixture of colloid substances. It swells in cold water, dissolves when the swollen mass is heated and sets to a jelly on cooling. A solution of gelatine may be sufficiently weak to be fluid when cold; on addition of alcohol the gelatine is thrown out of solution. Gelatine is dissolved in the cold by oxalic, hydrochloric, acetic and nitric acids. The mixture with the last named forms a liquid glue; that with acetic acid is used as a cement for celluloid. Barium chloride and chloral hydrate also dissolve gelatine in the cold. Alum, formaline and tannic acid harden gelatine, *i.e.*, render it insoluble in, and unswollen by, water.

Glycerine, colourless syrupy liquid, $C_3 H_5 (OH)_3$, of sp. gr. 1.265. It mixes with water or alcohol in all proportions, 100 parts of glycerine dissolve—lead acetate, 20 parts; alum, 15 parts; borax, 60 parts; potass bromide, 25 parts; soda carbonate, 98 parts; potass iodide, 40 parts. Glycerine is entirely non-volatile at the ordinary temperature, that is does not "dry up." A solution of it in water is therefore used as a bath for rendering supple the gelatine coating on papers or film after

drying; the water of the bath evaporates, leaving a small quantity of glycerine in the emulsion coating.

Glycin, para-oxy-phenyl-amido-acetic acid. It is a white powder of minute thin plates, very slightly soluble in water but readily soluble in alkaline solutions. Almost insoluble in alcohol.

Gold Chloride.—The yellow crystals commonly sold in Great Britain are a compound of gold chloride and sodium chloride of the formula $NaAuCl_4 \cdot 2H_2O$. Each 15 grs. thus contains $7\frac{1}{2}$ grs. of gold metal. Another commercial form of gold chloride is the brown crystals of formula $HAuCl_4 \cdot 3H_2O$, likewise containing half their weight of gold metal.

Hydrochloric acid, *i.e.*, muriatic acid, a solution in water of the gas HCl . The pure commercial acid has sp. gr. of 1.16 and is a strongly fuming corrosive liquid, which acts chemically and dissolves the oxides and carbonates of most of the metals. "Spirits of salt" is a crude form of hydrochloric acid, containing iron, etc., and is a powerful cleanser of glass vessels containing mineral deposits.

Hydrofluoric acid, strongly fuming and highly corrosive solution of hydrofluoric acid gas, HF . Commercially the acid is sold of strengths 40 per cent. and 55 per cent. It must be kept in gutta-percha bottles, as it attacks glass and thus is used for detaching the gelatine film from glass negatives. All contact of even a weak solution of the acid with the fingers must be avoided.

Hydroquinone, *i.e.*, quinol-hydrokinone, hydrochinon, dihydroxy-benzene, $C_6H_4(OH)_2$

Fine white needle crystals, dissolving in about 18 parts of water, in two parts of 90 per cent. alcohol, or in 6 parts of acetone. Hydroquinone, if pure, should dissolve completely in ether.

Hypo, hyposulphite of soda, sodium thiosulphate, $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$. Obtainable as small pea crystals or as much larger crystals of hexagon shape. The latter, though cheaper, are a more active form of hypo. Extremely soluble in water, which dissolves nearly twice its weight of hypo. The solution becomes thereby chilled, so that it is better to use warm or hot water in dissolving hypo. Most acids and acid salts decompose hypo, giving rise to sulphurous acid (odour of burning sulphur) and to a yellowish deposit of sulphur in the solution. Sulphurous acid and its acid salts have not this effect on hypo. In photography hypo is used as a chemical solvent of the silver bromide or silver chloride in the emulsions of plates or papers. It is a much less active solvent of silver iodide. Hypo is also obtainable in the dry or anhydrous form, *i.e.*, without the 5 molecules of water of crystallisation. The dry variety is a white powder, which dissolves in water much more rapidly than the crystals. In fixing, 3 parts of the dry are equivalent to about 5 parts of the cryst.

Iodine, greyish violet flakes or plates of metallic lustre. It is insoluble in water but dissolves readily in alcohol. It is also readily soluble in a solution of potass iodide. By mixing the iodine flakes with about three times their weight of iodide crystals and adding just enough

water to cover the latter, the iodine dissolves at once, remaining in solution when adding further water. With starch iodine forms an intensely blue compound. Iodine stains on fingers, etc., disappear in hypo or sulphite.

Lead acetate, sugar of lead, $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2 \cdot 3\text{H}_2\text{O}$. Clear white crystals dissolving in $1\frac{1}{2}$ times their weight of cold water; hot water should not be used. When using tap water, the solution will be slightly milky from formation of lead chloride, sulphate or carbonate. Slightly soluble in alcohol and soluble in glycerine.

Liver of sulphur, Potassa sulphurata, an impure form of potassium sulphide, containing small proportions of sulphate and carbonate of soda, hypo and polysulphide compounds. Sold in pieces of reddish-brown colour, very soluble in water.

Mercuric Iodide, bi-iodide of mercury, HgI_2 . Bright red powder insoluble in water, but dissolving readily in solution of potass iodide, hypo or soda sulphite. The solution in sulphite forms the *Lumière* mercury intensifier. Intensely poisonous.

Mercury bichloride, mercuric chloride, corrosive sublimate, HgCl_2 . Heavy fibrous pieces or crystalline powder. One part requires 16 parts of cold water, but less than 2 parts of boiling water for solution. Much more soluble in cold water if hydrochloric acid or ammonium chloride is added. Very soluble in alcohol; less so in ether. The solutions are intensely poisonous and should on no account be allowed to come in contact with broken skin.

Metol, sulphate of methyl-par-amido-phenol. White crystalline

powder, readily soluble in cold water, but almost insoluble in alcohol or ether. Metol dissolves with some difficulty in sulphite solution. Hence, in making up developers, the metol should be dissolved before the sulphite.

Nitric acid.—Strongly corrosive and fuming liquid, mixing in all proportions with water. The commercial strong pure acid or 1.42 sp. gr. contains 71 per cent. of real acid, HNO_3 . Nitric acid acts vigorously on almost all metals and metallic oxides and carbonates, dissolving them with formation of nitrates. It is a powerful oxidiser of organic substances. Burns the skin and clothes.

Oxalic acid, white crystals, $\text{H}_2\text{C}_2\text{O}_4$, dissolving in 10 parts their weight of cold water and in one-third their weight of hot water. Solutions made with ordinary tap water are milky from formation of oxalate of lime. On standing, the latter settles as a white deposit from which the almost clear solution can be poured off.

Paramidophenol, (base).—Yellowish-white crystalline powder, $\text{C}_6\text{H}_4\text{OHNH}_2$. Very slightly soluble in cold water; dissolves more freely in hot water. Dissolves in alcohol; less soluble in ether. The hydrochloride of paramidophenol is a crystalline powder readily soluble in 4 or 5 times its weight of water. Its keeping properties are much better than those of the free base. Like the latter, it is used for making concentrated single-solution developers in conjunction with a caustic alkali.

Potass bichromate, bichromate of potash, potass dichromate, red chromate of potash, $\text{K}_2\text{Cr}_2\text{O}_7$. Large orange-red crystals

dissolving in about 14 parts of cold water; soluble in their own weight of hot water. By addition of ammonia the reddish orange colour of bichromate solution is changed to yellow, due to formation of mono or neutral chromate. Mixed with an acid, bichromate is a powerful oxidising agent. A saturated solution, mixed with about 1-20th of its volume of strong sulphuric acid, is a powerful cleanser of almost all kinds of dirt from bottles. It can be used repeatedly until exhausted.

Potass bromide, bromide of potash, KBr . Small colourless crystals, dissolving in $1\frac{1}{2}$ times their weight of cold water; very slightly soluble in alcohol; soluble in 3 to 4 parts of glycerine.

Potass carbonate, carbonate of potash, K_2CO_3 . Granular White powder which rapidly becomes moist by absorbing water from the air and must be kept closely stoppered. Dissolves in less than its own weight of cold water. The above refers to potass carbonate sold as "dry" or anhydrous. This is the variety to be used in photographic formulæ. The so-called "cryst" potass carbonate is of uncertain composition.

Potass chloro-platinite, protochloride of platinum and potassium, K_2PtCl_6 . Small red crystals, dissolving in about 6 times their weight of cold water; insoluble in alcohol. The salt should contain nearly half its weight (46 per cent.) of platinum metal. Solutions should be made in distilled water and, with addition of a drop of hydrochloric acid, kept in well stoppered glass bottles.

Potass cyanide, cyanide of potash, KCN . Sold as white hard

pieces (fused), of qualities equivalent to 30 per cent., 40 per cent., and 90/95 per cent. real cyanide. The last (of highest strength) should be used. It is very soluble in water or alcohol. Cyanide is intensely poisonous, the solution should not be allowed to come into contact with broken skin. A further danger is the production of prussic acid vapour on addition of an acid to cyanide solution. Cyanide is a powerful solvent of silver bromide and silver chloride and also of silver iodide, but its perceptible solvent action on the developed silver image makes it a less desirable fixing agent than hypo.

Potass ferricyanide, red prussiate of potash, $K_3FeC_6N_6$. Deep ruby red crystals, usually covered with a slight reddish coating. It is best to rinse the crystals in water before dissolving them; they are then seen to be clear ruby red. Ferricyanide dissolves in $2\frac{1}{2}$ times its weight of cold water, forming a yellowish brown solution if strong; greenish yellow, if weak. The solution does not keep very well; it should be kept in the dark. The keeping quality is improved by dissolving some ordinary salt along with the ferricyanide.

Potass ferrocyanide, ferrocyanide of potash, yellow prussiate of potash, $K_4FeC_6N_6 \cdot 3H_2O$. Large lemon-yellow crystals, dissolving in $3\frac{1}{2}$ times their weight of water. Insoluble in alcohol. By addition of an acid, solutions of ferrocyanide slowly give off slight fumes of the intensely poisonous prussic acid gas.

Potass iodide, iodide of potash, KI. Small white crystals, dissolving in less than their own

weight of water. Slightly soluble in alcohol. Changes in the light, becoming slightly yellow. This is immaterial for its chief use in photographic work, viz., dissolving iodine.

Potass metabisulphite, $K_2S_2O_5$. White crystals which should be transparent, but usually have a slight incrustation, rendering them opaque. Dissolves fairly readily in cold water forming an acid solution smelling of sulphurous acid. Due to its acid nature, potass metabisulphite neutralises its own weight of cryst soda carbonate, half its weight of caustic potash, one-third its weight of caustic soda, or three-tenths its weight of dry potass carbonate. Is partially decomposed by hot water, which should not be used for dissolving it.

Potass oxalate, neutral oxalate of potash, $K_2C_2O_4 \cdot H_2O$. Colourless crystals dissolving in three times their weight of cold water; much more soluble in hot water. When dissolved in tap water, containing lime there is a considerable deposit of calcium oxalate. This settles in a few hours, when the almost clear solution can be poured off.

Potass permanganate, permanganate of potash, $K_2Mn_2O_8$. Small purple red crystals of metallic lustre. About 16 parts of cold water are required to dissolve 1 part of the crystals, but a strong solution is much more quickly made in hot water. The solution stains fingers, etc., a deep brown; the stain can be removed with a solution of metabisulphite or of oxalic acid, or by rubbing with crystals of these substances. A solution of permanganate, especially if made acid with sulphuric acid, instantly removes developer and

other stains from dishes. It leaves its brown stain, which is cleared off with metabisulphite or oxalic acid.

Pyrogallie acid, pyrogallol, tri-hydroxy-benzene, $C_6H_3(OH)_3$. Obtainable in two forms—(1) sublimed, fine feathery crystals, an ounce by weight of which occupies about 10 ozs. bulk, (2) crystallised, much denser, of about 1-10th the bulk. The properties of the two forms are the same. Extremely soluble in water and alcohol. The solution in water oxidises very rapidly and cannot be kept except with the aid of preservatives, such as sulphites, nitric acid, etc. When making up developers, the pyro should be added *after* these preservatives have been mixed with the water.

Silver nitrate, nitrate of silver, $AgNO_3$. Transparent or semi-transparent colourless flat crystals, dissolving in less than half their weight of water. To make a clear solution, distilled water must be used; the chlorides in most tap waters cause a milkiness. Solutions should be kept in glass-stoppered bottles in the dark. Silver nitrate causes intense brown or black stains on fingers or clothes; these can be removed by rubbing with tincture of iodine followed by strong solution of hypo.

Sodium acetate.—Colourless transparent crystals, $NaC_2H_3O_2 \cdot 3H_2O$, dissolving in less than three times their weight of cold water. Much more soluble in hot water.

Sodium bicarbonate, bicarbonate of soda, $NaHCO_3$. By grocers bicarbonate is sold as "carbonate of soda." Fine white powder requiring about 11 times its weight of cold water for solution. In hot water it is

partially decomposed, forming ordinary soda carbonate. Bicarbonate is very feebly alkaline, but neutralises acids. For this reason it is used in hypo baths for the fixation of self-toning papers; the bicarbonate neutralises the acid from the papers, without, however, making the fixing bath strongly alkaline.

Sodium bisulphite, $NaHSO_3$, is obtainable in the solid state, but more readily as a solution called soda bisulphite lye of average density, 36 deg. Baumé ($=1.33$ sp. gr.). This is a colourless or pale yellow liquor which can be used instead of soda sulphite. But unlike sulphite it is acid, neutralising a certain proportion of the alkali of a developer.

Sodium carbonate, i.e. carbonate of soda, sold in two forms, crystal, $Na_2CO_3 \cdot 10H_2O$, and dry or anhydrous, Na_2CO_3 . Washing soda is a somewhat impure form of crystal soda carbonate, which, for photographic use, should be in small clear crystals dissolving in water to a perfectly clear solution. The "dry" carbonate is a coarse powder which actively absorbs water, and must be kept well stoppered. One part of the dry carbonate is equivalent to slightly more than $2\frac{1}{2}$ parts of the cryst, e.g., in making up a developer .37 oz. ($=160$ grs.) of the dry is to be used in place of 1 oz. of the cryst and *vice versa*. The dry carbonate dissolves in about 6 times its weight of cold water; the cryst in $1\frac{1}{2}$ times. In the United States another strength of soda carbonate is commonly used as "desiccated." It is $Na_2CO_3 \cdot H_2O$, containing 85 per cent, dry or anhydrous carbonate. 1 oz. of this desic-

cated carbonate is equivalent to $2\frac{1}{2}$ ozs. of soda carbonate cryst. or 1oz. of the latter to .43 oz. (190 grs.) of the desiccated.

Sodium phosphate, i.e., phosphate of soda, di-sodium phosphate, neutral phosphate of soda, $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$. Large clear colourless crystals dissolving in about 7 times their weight of cold water. The solution is faintly alkaline.

Sodium sulphide.—The pure substance is in small colourless crystals, $\text{Na}_2\text{S} \cdot 9\text{H}_2\text{O}$, which rapidly become moist by exposure to the air. Exceedingly soluble in water. Commercial soda sulphide is similar except that it is yellowish in colour. By many workers the "commercial" and much cheaper sulphide is preferred for the darkening bath in sepia toning. Soda sulphide keeps well in strong solution, e.g., of 20 per cent. strength, but rapidly oxidises in a weak solution. This is why the working bath in sepia toning should be made up at the time of use by mixing a little strong sulphide solution with the required quantity of water.

Sodium sulphite, i.e., sulphite of soda, $\text{Na}_2\text{SO}_3 \cdot 7\text{H}_2\text{O}$. This cryst sulphite should be in clear crystals, which should be kept well corked, otherwise they become dull and powdery from partial oxidation. Sulphite which has become slightly encrusted may be rinsed for a few seconds in a measure with enough cold water to cover it, the water poured away, and the crystals dried on a clean cloth for weighing out. Cryst sulphite is most soluble in water at about 100 deg. F., about as hot as the hand can comfortably bear.

Dry or anhydrous sulphite. Na_2SO_3 , is a white powder which dissolves in water more readily than the cryst. One part of it is equivalent to 2 parts of the cryst.

Starch.—Fine white powder, $\text{C}_{10}\text{H}_{10}\text{O}_5$, which is insoluble in cold water, but in boiling water forms a kind of solution which, if strong, is a fairly stiff jelly or paste (starch mountant). Pure starch powder should be used for making mountant, not the granular laundry starch.

Sulphuric acid.—Thick highly corrosive heavy liquid of 1.84 sp. gr., containing 98 per cent. of the real acid, H_2SO_4 . This strong acid absorbs water rapidly from the air, becoming thereby weaker. When mixed with water, great heat is developed. The acid should always be added to the water. If water is added to the acid, the great heat may crack the vessel, and throw out part of the contents with almost explosive violence.

Sulphurous acid, solution in water of the gas SO_2 . The saturated solution has sp. gr. of 1.046, equivalent to 9.5 per cent. sulphurous acid, H_2SO_3 , but it rapidly loses strength by escape of SO_2 and by oxidation.

Tartaric acid.—Dry white crystals, $\text{C}_4\text{H}_4\text{O}_6$, soluble in less than their own weight of cold water, sparingly soluble in alcohol or ether, but freely soluble in glycerine.

Thiocarbamide, thio - urea, sulpho-carbamide, $\text{CS}(\text{NH}_2)_2$. Small colourless crystals requiring about 11 parts of their weight of cold water for solution, very soluble in hot water and in alcohol. In solution with an acid thiocarbamide removes developer stain.

MISCELLANEOUS INFORMATION.

Copyright in Photographs.

The law of the reproduction of photographs is now governed by the Copyright Act, 1911, which came into force (in Great Britain) July 1, 1912.

Copyright is automatically created by the taking of the photograph. Registration of copyright is abolished.

Copyright in a photograph lasts for fifty years from the making of the negative.

Existing copyright photographs (made before July 1, 1912) obtain the full protection of copyright granted by the 1911 Act. They obtain this whether registered or not under the old Act.

The copyright belongs to the author unless first made "to the order" of some other person for a valuable consideration, in which case it belongs to the person giving the order.

The author is defined by the Act to be the owner of the negative when it was made.

A sitter who has his photograph taken by a photographer in the ordinary course, thereby obtains the copyright in it. The photographer does not obtain the copyright by making a reduced charge, etc., unless the copyright is assigned to him in writing. If, however, the

photographer invites a sitter to be photographed, without there being any obligation for the sitter to pay for the photographs, the photographer automatically becomes the owner of the copyright, even though he may afterwards sell copies of the photographs to the sitter.

The copyright belongs to the sitter who orders in the ordinary way, even though he (the sitter) may not pay for the photographs.

It is not necessary to mark photographs "copyright" when circulating them to newspapers, offering them for reproduction, but it is advisable to do so.

It is an infringement of copyright to reproduce a photograph without permission, and also to sell or offer for sale photographs which have been so made without the permission of the owner of the copyright. A photographer whose photographs have been infringed is therefore entitled to take action against both the actual infringer and also against shopkeepers and others who may be handling publications containing the infringing copies.

By taking action the photographer may obtain damages, and also injunctions for delivery to him of the infringing copies, and of any printing blocks or

plates used in their production. When it can be shown that infringement has been done knowingly, the infringer is liable to summary penalties in the shape of fines or even imprisonment.

The Act provides for copyright in cinematograph films, and permits photographs to be taken of copyright architectural works of art (buildings); and also of sculpture which is situated in a public place. Such photographing is not an infringement of the copyright in the architecture or sculpture.

In accordance with certain unpealed clauses of the Copyright Act of 1862 it is an offence against the photographer for his work to be fraudulently issued with a false name or marking, or to be exhibited or sold falsely marked.

Reproduction Fees.

According to an agreement concluded in June 1929 between associations representing London and provincial newspapers and the Proprietors Association of Press Photographic Agencies the minimum fees payable for the reproduction of photographs are as follows :—

LONDON.

Stamp-heads. Up to	
2½ sq. ins. ...	12s. 6d.
Portraits up to 15 sq. ins. ...	15s. 0d.
Any picture up to 30 sq. ins. ...	17s. 6d.
Any picture over 30 up to 50 sq. ins. ...	27s. 6d.
Any picture over 50 up to 80 sq. ins. ...	42s. 0d.
Any picture over 80 sq. ins. ...	90s. 0d.

PROVINCES.

The fees for first publication of photographs in Provincial or Scottish morning, evening or Sunday newspapers shall be :—
Stamp-heads. Up to

2½ sq. ins. ...	7s. 6d.
Any picture other than a stamp-head up to 50 sq. ins. ...	10s. 6d.
Any picture over 50 up to 80 sq. ins. ...	15s. 0d.
Any picture over 80 sq. ins. ...	17s. 6d.

Reprints (for photographs supplied on or after January 1st, 1929) :—

LONDON.

Stamp-heads ...	7s. 0d.
Pictures of any larger size ...	8s. 6d.

PROVINCES.

Stamp-heads ...	5s. 0d.
Up to 25 sq. ins. ...	6s. 0d.
Over... ...	7s. 6d.

The newspapers have offered similar terms to photographers in general except that *all* photographs supplied previous to and after October 1st, 1929, are subject to above reprint rate.

Weekly newspapers such as the *Sphere* pay a minimum fee of 10s. 6d. not exceeding 3 sq. ins.

14s. 0d. between 3 and 12 sq. ins.	
17s. 6d. " 12 and 30 " "	
30s. 0d. " 30 and 60 " "	
60s. 0d. " 60 and 90 " "	
100s. 0d. over 90 sq. ins.	

Other weekly publications (not trade papers) pay :—

10s. 6d. not exceeding 3 sq. ins.	
14s. 0d. between 3 and 30 sq. ins.	
25s. 0d. " 30 and 60 " "	
50s. 0d. " 60 and 90 " "	
90s. 0d. over 90 sq. ins.	

Trade papers pay :—

10s. 6d. not exceeding 30 sq. ins.	
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21s. 0d. between 30 and 60 sq. ins.
42s. 0d. " 60 and 90 " "
84s. 0d. over 90 sq. ins.

Minimum rates for photographs for advertisements, use on calendars, picture postcards, etc.

ADVERTISEMENTS IN NEWSPAPERS AND PERIODICALS.

Where a single photograph is supplied to be used in not more than three insertions of an advertisement, a minimum fee of £1 1s. is to be charged per insertion.

Where more than one photograph is supplied by the same firm for use in not more than three insertions of the same advertisement, a minimum fee of 10s. 6d. is to be charged for each insertion of each photograph after the first photograph, the first photograph being charged at a minimum fee of £1 1s. per insertion.

Where a single photograph is supplied to be used in more than three insertions of an advertisement, a minimum fee of £3 3s. is to be charged.

Where more than one photograph is supplied by the same firm for use in more than three insertions of the same advertisement, a minimum fee of £1 11s. 6d. is to be charged for each photograph being charged at £3 3s. 0d.

USE ON CALENDARS, PICTURE POSTCARDS, CHRISTMAS AND GREETING CARDS AND VALENTINES.

Calendars.—A minimum fee of £2 2s. per photograph, with exclusive calendar use for one year. If supplied without exclusivity, a minimum fee of 10s. 6d. is to be charged for each photograph.

Picture Postcards.—A minimum fee of 10s. 6d. per photograph.

Christmas and Greeting Cards and Valentines.—A minimum fee of 10s. 6d. per photograph.

Cigarette Stiffeners.—A minimum fee of 10s. 6d. per photograph, up to a minimum of 25 subjects.

Advertising Posters.—Up to single crown size, a minimum fee of £2 2s.; double crown, minimum fee of £3 3s.; 16-sheet poster, minimum fee of £10 10s.; 48-sheet poster, minimum fee of £21 0s.

Factory Act.

Premises in Great Britain where persons are *employed* in photographic work come within the regulations of the Factory and Workshops Act, 1901 (H.M. Stationery Office, 2s.). The Act does *not* apply to premises where assistants are *not* employed (one-man businesses).

Premises are classified as "factories" (places where mechanical power, including electric, is used) and "workshops" (places where power is *not* used.) The Act applies to both. Thus dark-rooms, printing-rooms are "workshops" but if fitted with power-driven apparatus (*e.g.*, drying machines, washers) are "factories."

The Act regulates hours and conditions of employment (as regards hygiene and safety) and requires particulars to be kept in a prescribed Register, as to the "young persons" employed and dates of periodical painting or lime-washing. Any accidents must be reported to the Inspector for the district.

H.M. Factory Inspectors are to a large extent technical experts

and it is always well to welcome their inspection and to invite their approval beforehand of new premises or changes in existing workshops.

Although not stated in the Act, the studio of a portrait photographer is *not* regarded administratively as coming under the Act, but studios of commercial photographers and photo-engravers are subject to the Act.

The following are the principal requirements which apply to photographic premises.

Notices.—There shall be displayed on the premises, so as to be read by employees, an abstract of the Factories and Workshops Act, name and address of district Inspector and particulars of the day and time of the weekly half-holiday. A General Register must also be kept of the particulars of "young persons" (males and females over 14 and under 18 years of age) employed. Particulars of the painting or lime-washing of workrooms must also be entered in the Register, and also details of any accident occurring to persons employed. The Register must be kept available and produced when demanded by the Inspector.

Hours of Employment.—There is no restriction as to the employment of men—including males over 18 years of age. Permissible hours of employment for women and young persons for full days are 6 a.m. to 6 p.m., 7 a.m. to 7 p.m., or 8 a.m. to 8 p.m., with 1½ hours interval for meals, of which at least 1 hour shall be before 3 p.m. On Saturdays (or other day appointed as half-holiday), 6 a.m. to 2 p.m., 7 a.m. to 3 p.m., or 8 a.m. to 4 p.m.,

with half an hour interval for meals. Times of employment and meals must be stated on the abstract affixed in the works.

Overtime.—In certain trades, classed as "seasonal," the period of employment of women on full days may be 2 hours longer than stated above on not more than 30 days in the year, with 2 hours interval for meals. At present photography is *not* classed as a seasonal trade under the Act.

Sundays.—A woman, young person, or child shall not be employed on Sunday, but there is no restriction for men.

Young persons (see above) must be certified (by the certifying surgeon appointed under the Act) as fit for employment. This is done by the Surgeon signing the General Register. The name and address of the Certifying Surgeon are shown on the Abstract of the Act, or may be obtained from the Factory Inspector. A nominal fee is chargeable by the Surgeon.

Accidents must be reported to the Inspector if such as to incapacitate an employee from following his ordinary occupation for 5 hours on any one of the three working days next after the occurrence of the accident.

Hygiene and Safety.—The Act requires sufficient cubic space, e.g., 250 cub. ft., per employee, reasonable temperature and ventilation and precautions against fire in premises: also the fencing of any moving part of a machine considered dangerous to employees. Precautions against fire apply particularly to the handling of celluloid films and plates, where smoking, use of naked lights, etc., should be prohibited. The possibility of

fire is greatest in the handling of roll-film. Fires from stocks of the thicker cut or portrait film negatives when stored with observance of due precautions (see below) are of rare occurrence.

Special Regulations. — In places where celluloid in the form of roll-film or cut film is used the Celluloid Regulations are operative (see below). These include fire-resisting storage, prohibition of naked lights and other sources of ignition unless adequately protected, no smoking in work-rooms and particularly easy means of exit, all workroom doors opening outwards or sliding. The Inspector should be consulted and his advice asked for on these matters. The Cinematograph Film Regulations do not apply to still photographic work nor to the manipulation of non-flam film.

Storage of Celluloid.

In Great Britain the storage of celluloid in the form of sensitive film or celluloid negatives is subject to the regulations set forth in "Statutory Rules and Orders, 1921, No. 1825" (H.M. Stationery Office, London, Edinburgh, Manchester, Cardiff and Belfast, price 1d.) under Section 79 of the Factory and Workshop Act.

A memorandum prepared specially for the information of professional photographers on the storage of celluloid on premises to which the Factory and Workshops Acts apply is obtainable from the Home Office, Whitehall, London, S.W.1.

As regards sensitive films kept on premises in quantity which as a rule does not exceed 14 lbs. storage in a drawer or cupboard

in a private office or other room in which no handling of celluloid is done is officially regarded as complying with the requirement for "safe storage."

The regulations in respect to developed negatives will depend to some extent on the amount of such negatives. Where the latter are of considerable weight, they require to be kept in a fire-resisting store, such as a cabinet or cupboard constructed of fireproof material, *e.g.*, sheet metal, asbestos sheeting, or wood effectively treated to resist flame. This store requires to be of sound construction and is to be kept locked. The door or lid needs to be so arranged that there is no naked light or open fire near at hand. The store should not be situated in a workroom where celluloid is handled nor on a stair, nor near a door, nor in a passage through which persons might have to pass to escape in the event of a fire. The nature of the contents should be clearly marked on the outside of the store, and a cautionary notice put up prohibiting the use of naked lights. An adequate supply of buckets of water should be kept always available close outside the store, water being the best extinguisher of celluloid.

The foregoing recommendations are for general guidance and are subject to modification, according to the quantity of celluloid, or on account of the design of the building or nature of the processes, at the discretion of the District Inspector of Factories.

Premises may be exempted from the above regulations on the authority of the Chief Inspector of Factories, Home Office, Whitehall, London, S.W.1.

The Shops Acts.

(Great Britain.)

Under the Shops Acts of 1911 and 1912, the parts of a photographer's premises in which goods are sold to the public is a "shop." As such, it must be closed one half-day in each week from 1 p.m. unless exempted on certain grounds.

It has, however, been held that a photographer may admit sitters to his establishment on the weekly half-holiday by previous appointment, but must not keep the "shop" open so that chance passers-by may enter.

In holiday resorts the half-day closing each week may be suspended for the whole or part of the season.

Assistants in a "shop," that is to say receptionists and others who take orders from customers, or despatch goods, are entitled under the Act each week to one-half-day holiday beginning not later than 1.30. The half-holiday may be on the half-day closing day or on another day of the week. The employer is required to put up a notice in his shop stating the days when his assistants are to have their half-holiday.

In holiday resorts in which an Order allowing shops to keep open during the holiday season on the weekly half-holiday is in force, an employer who satisfies the local authority that he gives his assistants a holiday on full pay of not less than two weeks during the year and posts a notice to that effect in his shop, need not give his assistants a half-holiday

during the time the Order is in operation.

The Shops Acts are administered by local authorities: applications for information on particular points should be addressed to the town council, urban or rural council in the photographer's district.

Registration of Business Names.

Under the Registration of Business Names Act, 1916, it is required that persons who carry on a business in Great Britain under a name which is not their true name or the name by which they have always been known shall register the business with the Registrar of Business Names and shall comply with certain regulations prescribed by the Act.

Under the Act it is required that a person or partnership shall register if the "business name" includes any addition to the name of the person or names of partners. Thus Joseph Jones need not register if he trades as "Jones" or as "J. Jones," but if he trades as "Jones & Co." he must register. Similarly two partners, J. Jones and F. Jones, are required to register if trading as "Jones Bros."

The Act applies to those of British nationality as well as to aliens.

Also every individual or firm who, or a member of which, has either before or after the passing of the Act changed his name is required to register. But this provision does not apply to a woman who has changed her name by marriage.

The cost of registration is 5s. Offices of the Registrars are: England and Wales, Somerset House, W.C. 2; Scotland, Exchequer Chambers, Parliament Square, Edinburgh; Northern Ireland, 15, Donegall Square West, Belfast; Irish Free State, Coleraine House, Dublin.

Registered firms are required to exhibit the certificate of registration in a conspicuous place in their premises.

Registered firms are also required to state in legible characters in all trade catalogues, trade circulars, show cards and business letters, on which the business name appears, the present christian name, or initial and present surname of the individual proprietor; and those of all partners, in the case of businesses belonging to more than one person.

If the individual proprietor or partners are not of British nationality, the nationality must also be stated on such business stationery; and if there has been a change of nationality, the original nationality must also be stated.

Fines not exceeding £5 may be inflicted for failure to register, or non-observance of the provisions relating to publication of names or nationality.

Photographers who come within the Act are not required to publish their true name on the photographs, postcards, etc., which they supply.

Passport Photographs.

The space provided for photographs on British passports measures $2 \times 2\frac{1}{4}$ inches. Photographs require to be unmounted and to be made preferably on paper of thin substance, allowing of ready mounting on the page of the passport.

Exhibitions.

The chief exhibitions held in England are:—

Royal Photographic Society. Pictorial and technical. September-October. Secretary: H. H. Blacklock, 35, Russell Square, London, W.C.

London Salon. Pictorial only. September-October. The Secretary, 5A, Pall Mall East, London.

Northern. Pictorial and technical. Organized by Bradford P.S. or Manchester A.P.S. (see under Societies).

Scottish Salon. Pictorial only. January or February. Organized by Scottish Photographic Federation. (*q.v.*).

Midland. Chiefly pictorial. September or October. Organized by Midland Counties Federation (*q.v.*).

In France.

Paris Salon. Pictorial only. October. French Photographic Society, 51, Rue de Clichy, Paris.

Text-Books.

Those of the books in the following list which are still in print are obtainable by order from all photographic dealers. But a very large number are now out of print, though obtainable, in many cases, from dealers in second-hand books.

Elementary and General.

- Photography, Theory and Practice.* L. P. Clerc. Ed. George E. Brown. 35s.
The Art of the Photographer. E. Drummond Young. 21s.
First Aid to the Amateur Photographer. Will R. Rose. 2s. 6d.
Amateur Photography. F. T. Beeson and A. Williams. 2s. 6d.
Photography Made Easy. R. Child Bayley. 3s.
Ilyrd Manual of Photography.
Sinclair Handbook of Photography. 1s. 6d.
All about Photography. P. R. Salmon. 2s. 6d.
Barnet Book of Photography. 3s.
The Photographic Instructor. J. I. Figg. 4s.
A Primer of Photography. Capt. Owen Wheeler. 3s. 6d.
Photographic Technique. L. G. Hibbert. 2s. 6d.
Photography: Principles and Practice. C. B. Neblette. 30s.
Science and Practice of Photography. Chapman Jones. 6s.
Instruction in Photography. W. de W. Abney. 7s. 6d.
Dictionary of Photography. E. J. Wall. 7s. 6d.
The Complete Photographer. R. Child Bayley. 15s.
Photography: Principles and Applications. A. Watkins. 10s. 6d.
History of Photography. W. Shepperley. 10s. 6d.

- Photography as a Business.* Arthur G. Willis. 5s.
Photography as a Scientific Implement. 30s.
Photography of To-day. H. Chapman Jones. 6s.
The Camera as Historian. H. D. Gower, L. Stanley Jast, and W. W. Topley. 6s.

Optics and Chemistry.

- Fundamentals of Photography.* C. E. K. Mees. 4s.
Camera Lenses. A. Lockett. 2s. 6d.
Photographic Lenses. Conrad Beck and Herbert Andrews. 1s.
The Optics of Photography and Photographic Lenses. J. Traill Taylor. 3s. 6d.
Soft-focus Lenses. (No. 184 of *Photo-Miniature*.)
Modern Telephotography. Capt. Owen Wheeler. 1s. 6d.
Telephotography. C. F. Land-Davis. 3s. 6d.
Photographic Chemicals and Chemistry. T. L. J. Bentley and J. Southworth. 3s. 6d.
The Chemistry of Photography. R. Meldola. 6s.
Photographic Researches of Hurter and Driffeld. W. B. Ferguson. 25s.

Special Branches.

- Studio Portrait Lighting.* Herbert Lambert. 15s.
Commercial Photography. D. Charles.
Complete Press Photographer. Bell R. Bell. 6s.
Towles' Portrait Lightings. Will H. Towles. 21s.
The Real Pictorialism. F. C. Tilney. 1s.
Principles of Photographic Pictorialism. F. C. Tilney. 25s.
Photographic Amusements. F. R. Fraprie and W. E. Woodbury. 15s.

- Photography on Tour.* 6d.
The Portrait Studio. Practicus of the B.J. 1s.
Studio Construction. (No. 182 of *Photo-Miniature.*)
Portraiture, Parts I and II. F. C. Tilney. 1s. each.
Sketch Portraiture. R. Spencer Adamson. 9d.
The Photographic Studio. T. Bolas. 2s.
Lighting in Photographic Studios. P. C. Duchochois. 1s. 6d.
The Studio, and what to do in it. H. P. Robinson. 3s. 6d.
Commercial Photography. Practicus. 1s.
Flashlight. J. J. Curtis. 1s.
Magnesium Light Photography. F. J. Mortimer. 1s. 6d.
Reflex Cameras. (No. 151 of *Photo-Miniature.*)
Photography of Moving Objects and Hand-camera work for Advanced Workers. Adolphe Abrahams. 1s. 6d.
How to Make Good Pictures. (Kodak.) 2s.
Copying Methods. (No. 156 of *Photo-Miniature.*)
Nature Photography for Beginners. E. J. Bedford. 7s. 6d.
Stereoscopic Photography. A. W. Judge. 15s.
Photo-micrography. E. J. Spitta. 12s.
Aerial Photography. C. Winchester and F. L. Mills. 25s.
Airplane Photography. H. E. Ives. 18s.
Photographs for the Papers. John Everard. 2s. 6d.
Free-lance Journalism with a Camera. R. H. Mallinson. 2s. 6d.

Negative Processes.

- The Wet Collodion Process.* Arthur Payne. 3s.
Collodion Emulsion. H. O. Klein. 5s.

- Photographic Emulsions.* E. J. Wall. 21s.
Perfect Negatives. Dr. B. T. J. Glover. 1s.
The Photography of Coloured Objects. C. E. K. Mees, 2s. 6d.
Photographic Rendering of Colour in Monochrome. B. T. J. Glover. 1s.
The Watkins Manual (of exposure and development). Alfred Watkins. 1s. 3d.
Intensification and Reduction. E. J. Wall. 1\$.
Retouching and Finishing for Photographers. J. Spencer Adamson. 4s.

Printing Processes.

- Photographic Printing, Commercial and Professional.* R. R. Rawkins. 3s. 6d.
Print Perfection. Dr. B. T. J. Glover. 1s.
Toning Bromide Prints. R. Blake Smith. 1s. 6d.
Enlarging for All. Dr. B. T. J. Glover. 1s.
Carbon Printing. E. J. Wall. 1s. 6d.
Bromoil and Bromoil Transfer. L. G. Gabriel. 7s. 6d.
Bromoil Printing and Transfer. Dr. E. Mayer. \$2-50.
Bromoil and Oil Prints. Jas. A. Sinclair. 2s.
The Art of Pigmenting. Bertram Cox and F. C. Tilney. 1s.
Oil, Bromoil and Transfer. Fred. Judge and F. C. Tilney. 1s.
Expression in Pigmenting. F. C. Tilney. 1s.
Oil and Bromoil Processes. F. J. Mortimer and S. L. Coulthurst. 1s. 6d.
Oil and Bromoil Printing. (No 106 of *Photo-Miniature.*)
Perfection in the Pigment Processes. Chris. J. Symes. 1s.
Kallitype Processes. (No. 185 of *Photo-Miniature.*)

- Blue Printing and Modern Plan Copying.* B. J. Hall. 6s.
Photographic Enamels. René d'Heliecourt. 1s. 6d.
Treatise on the Air-brush. S. W. Frazer and G. F. Stine. 12s. 6d.

Lantern and Cinematograph.
Optical Projection. R. S. Wright. 4s. 6d.

Lantern Slides. B. T. J. Glover. 1s.

Practical Slide-making. G. T. Harris. 1s. 6d.

Living Pictures. R. B. Foster. B.Sc. 6s.

The Guide to Kinematography. Colin N. Bennett. 10s. 6d.

Amateur Cinematography. Capt. Owen Wheeler. 6s.

Cine-Photography for Amateurs. J. H. Reyner. 10s. 6d.

Film - Play Production for Amateurs. G. H. Sewell. 5s.

Cinematography and Talkies. J. R. Cameron and J. A. Dubray. \$4.

Process Work.

Ilford Manual of Process Work. L. P. Clerc. 7s. 6d.

Horgan's Half-tone and Photo-mechanical Processes. S. H. Horgan. 12s. 6d.

Photo-mechanical Processes. W. T. Wilkinson. 4s.

Elements of Photogravure. C. N. Bennett. 5s.

Colour Photography.

Colour Photography. Capt. Owen Wheeler. 12s. 6d.

Practical Colour Photography. E. J. Wall. 12s. 6d.

Natural-colour Photography. Dr. E. König. 3s.

Bye-Paths of Colour Photography. "O. Reg." 5s.

The Technique of Colour Photography. F. R. Newens. 4s. 6d.

The History of Three-Colour Photography. E. J. Wall. \$15.

Trade Booklets.

The following booklets of technical information are issued by the undermentioned firms in the photographic trade. Except where otherwise stated, the booklets are sent post free to any applicant.

Adhesive Dry-Mounting Co.

Dry-Mounting.

Border Tints.

Agfa, Ltd.

Flashlight Photography.

Process Plates and Films.

Rodinal Developer.

Development in Bright Light (Desensitising).

Agfa Colour Plates.

Aldis Bros.

Aldis Lens Book.

Soft Focus with Aldis Lenses.

Lenses for Enlarging.

Autotype Co., Ltd.

First steps in Autotype Printing.

Rotary Gravure Tissues (in English, French and German).

Trichrome Printing.

Carbo Process.

Autotype Ceramic Tissues.

Photo-litho Transfer Papers.

Burroughs Wellcome & Co.

Floodlights on Photography.

After-treatment in Photography.

Essentials in Photography.

Colour in Photography.

Time Tables for Development.

Colours in Prints and Lantern Slides.

J. H. Dallmeyer, Ltd.

Why a Telephoto?

Lenses for Amateur Cinematography.

Dennison Mfg. Co.

Passe-Partout Framing.

Window Display.

Elliot & Sons, Ltd.

How to make Snapshots that Sell (3d.).

Ensign, Ltd.

Optical Lanterns.

Amateur Ciné-Cameras and Projectors

Finlay Processes.
 Finlay Colour Photography.
Gevaert, Ltd.
 Vittex Paper.
 X-ray Films.
 Amateur Cine with Gevaert
 16-mm. Film.
 Graphic Plates and Films.

Grant, Thos. K.
 Autochrome Plates.
 Autochrome Filmcolor.

Hewitt Electric Co.
 Studio Lighting (mercury
 vapour).

Ilford, Ltd.
 Ilford Exposure Tables.
 Ilford Plates and Films.
 Ilford Hyper-sensitive Plates
 and Films.
 Developments in Infra-red
 Photography.
 Selo Film.
 Ilford Colour Filters.
 Ilford Bromide and Clorona
 Papers.
 Seltone Papers.
 Enitone Printing Paper.
 Oleobrom Process
 Oleobrom Inking Manipulation.
 Development in Oleobrom
 Transfer.

Selo Ciné Films.
 Lantern Slides on Dry Plates.
 Ilford X-ray Plates and Films.
 X-ray Intensifying Screens

Illingworth & Co., Ltd.
 Slogas Gaslight Paper.

Imperial Dry Plate Co., Ltd.
 Imperial Handbook.
 Faults in Negatives.

Johnson & Sons.
 Time Development (Azol).
 Flashlight Photography.
 Colours for Tinting.

Johnson Matthey & Co.
 Memoranda for Manufacturers.

Kodak, Ltd.
 Modern Dark Room Illumina-
 tion.

Development of Roll-film.
 Kodak Cut Film.
 Eastman Professional Film.
 Kodacolor Explained.
 Transferotype Paper.
 Kodak Bromide and Bromoil
 Papers.
 Kodura.
 Photography of Furniture and
 Glassware.
 Photo-Micrography (6d.).
 Process Work with Dry Plates
 and Films (2d.).
 How to make good pictures (1s.).
 Real Orthochromatism (6d.).
 The Photography of Coloured
 Objects (2s. 6d.).
 Wratten Light-Filters (2s.).
 The Camera Book (3s. 6d.).
 Elementary Photographic
 Chemistry (1s.).
 The Fundamentals of Photo-
 graphy (5s.).

Kosmos Photographics, Ltd.
 Kosmos Photographic Papers.
 Vitegas Printing Paper.

Peeling & Van Neck, Ltd.
 Optical Equipment for Process
 Engravers.
 Camera Anatomy.

Soho, Ltd.
 Soho Reflex Camera.

Vanguard Co.
 Varnishing Negatives Made Easy
 Firelight Portraits by Daylight.
 Colouring Prints and Slides.
 Intensification and Reduction.
 Saving Over-printed Bromides.

Zeiss, Carl.
 Zeiss Photo Lenses (On the
 Choice of a Lens).
 Lenses and How They are Made.
 The Eagle Eye of a Camera.
 Telephoto Lenses and Tele-
 Tessar.
 Proxar and Distar Lenses.
 Universal Tessar.
 Zeiss Biotessar.
 Zeiss Yellow (Glass) Filters.

Permits to Photograph.

London Area.

Westminster Abbey.—From the Chapter Clerk, the Sanctuary, Westminster. Permission is rarely given. A fee of 5s. is required for each photograph.

St. Paul's Cathedral.—From the Dean's Verger. Fee, 2s. 6d. per day.

Tower of London.—From the Resident Governor.

Houses of Parliament.—From the Secretary, Lord Chamberlain's Office, House of Lords.

Guildhall.—From the City Surveyor, Guildhall, E.C. 2

Picture Galleries (National Gallery, Tate Gallery).—Permission given only to professional photographers.

British Museum.—Special permission granted for use of stand cameras only by application in writing to the Director.

Victoria and Albert Museum.—From the Director and Secretary, South Kensington, S.W. 7. There are special restrictions.

Zoological Gardens (Regent's Park and Whipsnade).—A fee of 2s. 6d. (on each occasion) is charged for permission to use a stand camera. Hand-cameras of any size may be used without permit. Ciné hand cameras for sub-standard film may be used by bona-fide amateurs without permit. A fee of £12 is charged for permission to take commercial ciné films. Application to the Secretary, Zoological Society, Regent's Park, London, N.W.

Royal Parks.—No permission required for use of hand cameras, provided that portraits or groups are not taken. For stand cameras, permission requires to be obtained from the Secretary, H.M. Office of Works, Storey's Gate, Westminster, S.W. 1. This applies to Hyde Park, Green Park, St. James' Park, Primrose Hill, Regent's Park, Greenwich Park, Richmond Park, Bushey Park and Hampton Court Park, Gardens and Green.

Other Parks.—Almost all other Parks in the London area are under the control of the L.C.C. Permits to use stand cameras on application to the Chief Officer, Parks Department, The County Hall, Westminster Bridge, S.E. 1.

Kew Gardens.—On payment of 3d. in addition to charge for admission.

Burnham Beeches.—From the Town Clerk, Guildhall, E.C. 2.

Epping Forest and Wanstead Park.—From the Town Clerk, Guildhall, E.C. 2.

Castles.—In most cases on application personally. At Raglan Castle the fee for amateurs is 1/-, professionals 10s. Stokesay Castle: amateurs free, professionals £1 1s. In England and Scotland a great many historic buildings are in the charge of H.M. Office of Works.

Provinces.

Cathedrals.—Permission to use a camera in English Cathedrals is obtainable on application, in the great majority of cases, to the Dean. In some few instances no fee is charged.

Photographic Periodicals.

- Abel's Photographic Weekly, 515, Caxton Building, Cleveland, Ohio, U.S.A.
- Agfa-Photoblat, 65-67, Lohmühlenstrasse, Berlin, S.O. 36.
- Allgemeine Photographische Zeitung, Verlag, Jos. A. Detoni, Vienna VI., Mollardgasse 40.
- Amateur Photographer and Cinematographer, Iliffe & Sons, Ltd., 20, Tudor Street, London, E.C. 4.
- American Annual of Photography, 428, Newbury Street, Boston 17, Mass., U.S.A.
- American Photography, 428, Newbury Street, Boston 17, Mass., U.S.A.
- Art Photographique, Rue Markelbach, 152, Brussels.
- Atelier, W. Knapp, Mühlweg, 19, Halle a/Saale, Germany.
- Australasian Photo-Review, Kodak (Australasia), Ltd., 379, George Street, Sydney, Australia.
- British Journal of Photography, Henry Greenwood & Co., Ltd., 24, Wellington Street, Strand, London, W.C. 2.
- British Journal Photographie Almanac, Henry Greenwood & Co., Ltd., 24, Wellington Street, Strand, London, W.C.
- Bulletin de l'Association Belge de Photographie, 230, Avenue Albert, Brussels.
- Bulletin de la Société Française de Photographie, 51, Rue de Clichy, Paris, IX.
- Bulletin of Photography, 636, Franklin Square (Cor. 7th and Race Streets), Philadelphia, U.S.A.
- Camera, 636, Franklin Square (Cor. 7th and Race Streets), Philadelphia, U.S.A.
- Camera, C. J. Bucher A.-G., Lucerne, Switzerland.
- Camera, 2, Crow Street, Dublin.
- Camera Craft, 413/415, Claus Spreckels Building, San Francisco, Cal., U.S.A.
- Commercial Photographer, Abel's Publishing Co., 515, Caxton Building, Cleveland, Ohio, U.S.A.
- Correo Fotográfico, Maipu 231, Buenos Aires, Argentine Republic.
- Corriere Fotográfico, 6, Via Stampatori, Turin, Italy.
- Focus, Bloemendaal, Holland.
- Foto Revista, Alsina 974, Buenos Aires, Argentine Republic.
- Fotograf Polski Ul. Czackiego 3/5, Warsaw.
- Jahrbuch für Photographie und Reproduktionstechnik, W. Knapp, Halle a/S., Germany.
- Kodak Magazine, Kodak, Ltd., Kingsway, London, W.C. 2.
- Lichtbild, Verlag Josef F. Rimpler, Haida-Böhmen, Czechoslovakia.
- Linse, Derfilingenstrasse 23, Berlin-Lankwitz.
- L'Instantané, 60, Rue Lhomond, Paris V.
- Monthly Abstract Bulletin, Research Laboratory, Eastman Kodak Co., Rochester, N.Y., U.S.A.
- Nouvelles Photographiques, 3, Rue Rossini, Paris.
- Optician, Hatton Press, Ltd., 72-78, Fleet Street, London, E.C. 4.
- P.P.A. Record, Professional Photographers' Association, 357, Euston Road, London, N.W. 1.
- Photo-Era, Amalgamated with "American Photography."
- Photokunst, Damburggstreet 265, Antwerp.
- Photo-Markt, Mariähilferstrasse 31, Vienna.
- Photo-Miniature, 70, Fifth Avenue, New York, U.S.A.
- Photo Pour Tous, 37, Rue Lafayette, Paris-Opera.
- Photo-Pratique, 3, Rue Rossini, Paris.
- Photo-Revue, 118, Rue d'Assas, Paris VI.
- Photo-Woche, Lindenstrasse 26, Berlin.
- Photofreund, 33, Stallschreibenstrasse, Berlin, S. 14.
- Photograph, L. Fernbach, Bunzlau.
- Photographie, 189, Rue St. Jacques, Paris V.
- Photographic Abstracts, Royal Photographic Society, 35, Russell Square, London, W.C. 1.
- Photographic Dealer, Sicilian House, Southampton Row, London, W.C.
- Photographic Journal, 35, Russell Square, London, W.C. 1.
- Photographische Chronik, W. Knapp, Halle a/Saale, Germany.
- Photographische Industrie, Krausenstr., 35/36, Berlin, S.W. 19, Germany.
- Photographische Korrespondenz, Schottengasse 4, Vienna 1., Austria.
- Photographische Rundschau 19, Mühlweg, Halle a/S., Germany.
- Photographie für Alle, Krausenstrasse 35-36, Berlin, S.W. 19.
- Polski Przegląd, Fotograficzny, Kasimierz Greger, ul 27, Grudnia 20, Poznań, Poland.
- Procédé, 150, Boulevard de Montparnasse, Paris, XIV.
- Process Engravers' Monthly, 12, Farringdon Avenue, London, E.C. 4.
- Progresso Fotografico, R. Nannias, Via Tullio Morgagni N. 2, Milan, Italy.
- Revue d'Optique, 3-5, Boulevard Pasteur, Paris, XVe.
- Revue Française de Photographie, 189, Rue St. Jacques, Paris, V.

Science et Industries Photographiques,
Paul Montel, 189, Rue Saint-Jacques,
Paris, V.

Snapshots, 2, Dyer's Buildings, Holborn-
London, E.C. 1.

Valokuvauus, Aleksanterinkatu 38, Helsinki,
Suomi, Finland.

**Zeitschrift für Wissenschaftliche Photo-
graphie**, J. A. Barth, 16, Dörrienstrasse,
Leipzig, Germany.

Contractions.

The following is a list of the contracted descriptions most commonly occurring in photographic literature, catalogues of photographic requisites and advertisements in photographic journals. Especially to those in foreign countries it is thought that the meaning of these various contracted descriptions will be of service.

B.—mark on exposure shutters, signifying "bulb," that is, setting of the shutter at which shutter remains open as long as the release is pressed.

B. & W.—black and white. Used in description of photographs worked up (in black) with crayon, air-brush, or other method.

B.P.—British Pharmacopœia. Indicates standard of strength and purity of chemicals.

C.—Centigrade. Degree of temperature.

C.C.—collodio-chloride printing paper.

c.c.—cubic centimetre, metric measure of volume. About 17 minims.

C. de V.—carte de visite, an early size—about $3\frac{1}{4} \times 2\frac{1}{4}$ inches—of portrait photograph.

Cent.—Centigrade. See C. above.

c.p.—candle power.

C.P.—chemically pure. Trade description of chemicals.

cryst.—crystallised. Indicates the crystallised form of any chemical as distinguished from the dry or anhydrous form.

D. & E.—day and electric. Used in reference to portrait studios.

D.O.P.—Developing-out paper. Term used in United States for gaslight papers.

D. & P.—developing and printing. The term is understood to mean the commercial quantity development of roll-

film and the making of prints from the resulting negatives. In United States the corresponding description is "Photo Finishing."

E.H.—Eder-Hecht. Designation of plate speed used in Germany.

F.—Fahr. or Fahrenheit. Degree of temperature.

F.P.—focal-plane (shutter).

F.P. adapter.—film-pack adapter. Frame for using a film-pack on a plate camera.

H. & D.—Hurter and Drifffield. Designation of speed of plates.

I.—instantaneous. Marking on shutters indicating that at this setting the shutter gives one or other of the instantaneous (snapshot) exposures.

M.—moment. Marking on shutters or German manufacture, indicating that at this setting the shutter gives one or other of the instantaneous exposures.

mm.—millimetre. 100 mm. equal 4 inches, very nearly.

M.Q.—metol-hydroquinone.

O.—often. Marking on shutters of German manufacture equivalent to B, which see.

P.C.—postcard. In reference to cameras, plates and printing papers denotes a size of $3\frac{1}{2} \times 5\frac{1}{2}$ inches.

P.O.P.—printing-out paper. Contraction first used (in Britain) for gelatino-chloride print-out paper.

P.S.—plate sunk (mounts).

q.s.—quant. suff. In formulæ, denotes that sufficient of the chemical is to be used to produce a particular effect.

sp. gr.—specific gravity. Weight in comparison with an equal bulk of water.

T.—time. Marking on shutters denoting that at this setting the shutter opens on pressing the release and remains open until the release is again pressed.

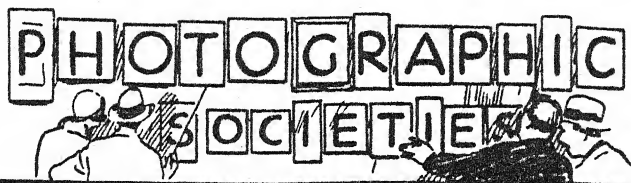
U.S.—uniform system. A system of diaphragm markings according to which $f/4$ is 1, $f/5.6$ is 2, $f/8$ is 4, and so on.

V.P.—vest pocket. Size of camera. Generally understood to indicate a camera taking a picture 45×60 mm. in size = $1\frac{1}{2} \times 2\frac{3}{8}$ inches.

W.A.—wide angle (lens).

W.Y.W.—while-you-wait. Applied to portrait studios and also to cameras such as those used in beach photography for making ferrotype and similar portraits.

Z.—zeit. Marking on shutters of German manufacture. It is equivalent to T, which see.



Societies in Great Britain

(Including Northern Ireland.)

The following list has been compiled from data supplied by their respective secretaries.

Royal Photographic Society of Great Britain.

FOUNDED 1853.

Anyone who is interested in either the science or the art of photography, as an amateur or a professional, is eligible for membership.

Patrons.—His Majesty the King; H.R.H. The Prince of Wales. *President.*—Olaf Bloch. *Vice-Presidents.*—Marcus Adams, Arthur S. Newman. *Ordinary Members of Council.*—H. Baines, S. Bridgen, A. J. Bull, P. C. Bull, R. H. Bullen, J. J. Butler, R. Chalmers, R. E. Crowther, H. O. Fenton, W. B. Ferguson, G. B. Harrison, H. Lambert, Ernest Marriage, E. A. Robins, F. J. Shepherd, R. N. Speaight, D. A. Spencer, H. Wormleighton. *Librarian.*—A. E. Cummins. *Meetings.*—Held at 35, Russell Square, London, W.C. Weekly on Tuesday, Thursday and Friday evenings from October to May inclusive. *Secretary.*—H. H. Blacklock, 35, Russell Square, London, W.C. 1.

Abbreviations.—C.C., Camera Club; P.C., Photographic Club; P.S., Photographic Society.

Aberdeen Photographic Association.—*Pres.*, G. Aubourne Clarke. *Meetings*, 154, Union Street, Tuesdays, 8 p.m. *Sec.*, Hilda M. Bailey, 63, Watson Street, Aberdeen.

Aberdeen Photo. Art Club.—*Pres.*, Wm. Maitland. *Meetings*, 220, Union Street, Thursdays, 7.30 p.m. *Sec.*, Wm. Duncan, 67, Bonaccord Street, Aberdeen.

Aberlillery C.C.—Meetings. Prudential Chambers Arcade, Thursdays, 7.30 p.m. *Sec.*, W. A. Bolingbroke, Marlborough Road.

Accrington C.C.—*Pres.*, J. C. Langstaffe. *Meetings*, Union Bank Chambers, Blackburn Road, Wednesdays, 7.45. *Sec.*, Miss M. Wells, 12, Marlborough Street, Accrington.

Accrington.—Wesley C.C.—*Pres.*, H. Oldham. *Meetings*, Wesley School, Abbey Street. *Sec.*, J. Hart, 140, Bold Street, Accrington.

Airdrie.—Monklands P. S.—*Pres.*, G. Hamilton. *Meetings*, Studio, Victoria Place, Tuesdays, 7.45 p.m., October to March. *Sec.*, Wm. Blair, 38, Stirling Street, Airdrie.

Altrincham.—St. Margaret's Church Institute Amateur Photographic Society.—*Pres.*, C. Lawton-Jones. *Meetings*, St. Margaret's Church Institute, Mondays, 8 p.m. *Sec.*, Mrs. A. Lawton-Jones, Kilrea, Market Street, Altrincham.

Armley and Wortley P.S.—*Pres.*, W. O. Walker. *Meetings*, West Leeds High School, Armley, Thursdays 7.45 p.m. *Sec.*, J. Page, 5, Wyther Parade, Wyther Park, Armley, Leeds.

Ashington and Hirst P.C.—*Pres.*, R. G. Webster. *Meetings*, North School, Ashington, Mondays, 7.30 p.m. *Sec.*, C. Stephenson, East School House, Ashington.

Ashton-under-Lyne P.S.—*Pres.*, Councillor S. A. Platt. *Meetings*, Church Street, Thursdays, 8 p.m. *Sec.*, Arthur Boone, 2, Albemarle Street, Ashton-under-Lyne.

Aston, P.S.—*Pres.*, A. E. Dicks. *Meetings*, Burlington Hall, High Street, Thursdays, 7.45 p.m. *Sec.*, J. H. Lovatt, 208, The Broadway, Birchfields, Birmingham.

Ayr Amateur P.S.—*Pres.*, John McClure. *Meetings*, 16, New Bridge Street, Thursdays, 7.30 p.m. *Sec.*, A. J. Oliver, 141, Prestwick Road, Ayr.

Barnard Castle and District P.S.—*Sec.*, E. Holdsworth, Mason's Pharmacy, Barnard Castle.

- Barnsley P.S.**—*Pres.*, T. M. Fowler, *Meetings*, Naturalist Society's Rooms, St. Mary's Gate, Tuesdays, 7.30 p.m. *Sec.*, G. F. Kaye, 6, Chilton Street, Barnsley.
- Barrow Naturalists' Field Club** (Photographic Section).—*Chairman*, J. W. Hughes. *Meetings*, Alternate Mondays, Technical College, 7.45 p.m. *Sec.*, R. W. Gimblett, 35, Harrison Street, Barrow.
- Barry C.C.**—*Meetings*, Y.M.C.A., Barry, Fridays, 8 p.m. *Secs.*, J. H. White, Caerleon, Pontypridd Road, Barry; and Arthur Rook, 29, Claude Road, Barry, Glam.
- Basingstoke C.C.**—*Pres.*, H. G. Jeffery, B.Sc. *Meetings*, Devon Café, London Street, Tuesdays, 7.30 p.m. *Sec.*, W. E. Thornton, 19, Penrith Road, Basingstoke.
- Bath P.S.**—*Meetings*, Royal Literary and Scientific Institution, alternate Mondays, 7.30 p.m., from October 10th. *Sec.*, H. W. Willmer, 2, Oak Avenue, Englishcombe Park, Bath.
- Bath and County C.C.**—*Meetings*, Royal Literary and Scientific Institution, Wednesdays, 7 p.m. *Sec.*, Francis H. Gray, Vine House, Weston, Bath.
- Battersea Men's Institute C. C.**—*Pres.*, J. P. Thomas. *Meetings*, Battersea Men's Institute, Lavender Hill, Tuesdays and Wednesdays, 8 p.m. *Sec.*, C. W. Hovey, 123, Trundleys Road, London, S.E. 8.
- Beckenham P.S.**—*Pres.*, H. F. Joel. *Meetings*, Art School, Tuesdays, 7.30 p.m., October to April. *Sec.*, 31A, Worbeck Road, Anerley, London, S.E. 20.
- Bedford C.C.**—*Pres.*, P. S. Hudswell. *Meetings*, Newnham Rooms, St. Cuthbert Street, Alternate Tuesdays, 8 p.m. *Sec.*, G. J. White, 4, The Broadway, Bedford.
- Belfast Central Presbyterian C.C.**—*Pres.*, A. McSaveny. *Meetings*, Assembly Buildings, Howard Street, Second and Fourth Tuesdays, 8 p.m., from October to April. *Sec.*, J. Carser, 92, Ravenhill Avenue, Belfast.
- Belfast.**—*Queen's Island P.S.*—*Pres.*, T. A. Smith. *Meetings*, Pirrie Park, Belfast, Second Wednesdays, 8 p.m. *Sec.*, R. Scott, 28, Wingrove Gardens, Bloomfield, Belfast.
- Bellshill and Mossend Y.M.C.A. C.C.**—*Pres.*, J. Struthers. *Meetings*, Y.M.C.A., Main Street, Thursdays, 8 p.m. *Sec.*, Robert Laird, Craiglea, Bellshill.
- Belmont C.C.**—*Pres.*, D. Norris. *Meetings*, Sherwood House, York Road, Battersea. *Sec.*, W. F. Webb, Belmont Works, Battersea, S.W. 11.
- Bethnal Green C.C.**—*Pres.*, Sir Percy Harris, M.P. *Meetings*, Men's Institute, 229, Bethnal Green Road, Wednesday and Fridays, 8.0 p.m. *Sec.*, G. Wright, 56, Allas Road, London, E. 1.
- Bexley Heath P.S.**—*Pres.*, T. H. Beecham. *Meetings*, Broadway Club, 255-257, Broadway, Second and Fourth Mondays, 7.30 p.m. *Secs.*, C. J. Challis, 36, Upton Road, Bexley Heath and Mrs. E. L. Tieman, 142, Mayplace Road, Bexley Heath.
- Birkenhead Y.M.C.A., P.S.**—*Pres.*, David White. *Meetings*, Club Room, Y.M.C.A., Grange Road, Wednesdays, 8 p.m. *Sec.*, R. Cheers, 37, Everest Road, Birkenhead.
- Birmingham P.S.**—*Pres.*, H. J. Shepherd. *Meetings*, 39, Great Charles Street, Tuesdays, 7 p.m. *Sec.*, E. H. Bellamy, 20, Waterloo Street, Birmingham.
- B'ham.**—*Britannic Assurance Co.'s C.C.*—*Pres.*, J. A. Jefferson. *Sec.*, P. F. Chumbley, Britannic Assurance Co., Ltd., Broad Street Corner, Birmingham.
- Birmingham Central Technical College P.S.**—*Pres.*, F. Green. *Meetings*, Technical College, Suffolk Street, Mondays, 7.30 p.m. *Sec.*, W. Rowley, 12, Heeley Road, Selly Oak, Birmingham.
- Birmingham Field Naturalists' Club.**—*Pres.*, J. Humphreys, M.A. *Meetings*, Digbeth Institute, Tuesdays, 7.30 p.m. *Sec.*, H. Potter, 387, Moseley Road, Birmingham.
- Birmingham.**—*Magnet (G.E.C.) P.C.*—*Pres.*, W. Wilson. *Meetings*, Magnet Club House, Witton, Mondays, 7.15 p.m. *Sec.*, W. E. Warom, Magnet Photographic Club, General Electric Co., Ltd., Witton.
- Birmingham Municipal Officers' Guild P.S.**—*Pres.*, Harry Goode. *Meetings*, Council House Recreation Room, alternate Wednesdays, 6.30 p.m. *Sec.*, Edward Pritchard, City Treasurer's Department, Council House, Birmingham.
- Birmingham Photographic Art Club.**—*Pres.*, A. L. Williams. *Meetings*, 197, Broad Street, Thursdays, 7.30 p.m. *Sec.*, N. G. Breeze, 33, Carlyle Road, Edgbaston.
- Bishop Auckland P.S.**—*Pres.*, Alfred Harburn. *Meetings*, Grosvenor Club, 1, Silver Street, First and Third Mondays, 7.30 p.m. *Sec.*, T. Ambler, 18, Raby Gardens.
- Bishopstord C.C.**—*Pres.*, Francis E. Powell. *Meetings*, Alexandra House, Queen Square, Bloomsbury, W.C. 1, Thursdays, 5.30 p.m. *Sec.*, A. J. L. Greig, 36, Queen Anne's Gate, Westminster, London, S.W. 1.
- Blackburn and District C.C.**—*Pres.*, J. Lund. *Meetings*, Kensington Chambers, Sudell Cross, Blackburn. *Sec.*, A. Shaw, 5, Carlton Road, Blackburn.

- Blackheath.—Christ's College P.S.—Pres.**, Arthur C. Wire, B.A. *Meetings*, Christ's College, Blackheath. *Alternate Mondays*, 6 p.m. *Sec.*, Christ's College.
- Blackpool and Fylde P.S.—Pres.**, E. Stevenson, J.P. *Meetings*, 41A, Market Street, Blackpool, Mondays and Tuesdays, 7.45 p.m. *Sec.*, John F. Cory, Flat 3, North Dene, Clevedon Road, Blackpool.
- Blairstown Photographic Association.—Meetings**, 35, Allan Street Blairstown, Thir'd Tuesdays, from March 17th, 7.30 p.m., except June to August. *Sec.*, E. H. Brown, Allan Street, Blairstown.
- Board of Education P.S.—Pres.**, D. F. Heard. *Meetings*, Board of Education, Whitehall, S.W. 1, Mondays, 4.45 p.m. *Sec.*, E. H. Stevens, Victoria and Albert Museum, South Kensington, S.W. 7.
- Bolton C.C.—Meetings**, Bradford Buildings, Mawdsley Street, Alternate Thursdays and Saturdays. *Sec.*, J. H. Bramley, 593, Chorley Old Road, Bolton.
- Borough Polytechnic P.S.—Pres.**, E. P. Huddy. *Meetings*, Borough Polytechnic, S.E. 1, Wednesdays, 8.0 p.m. *Sec.*, W. E. Goodchild, 93, Longley Road, S.W. 17.
- Bournemouth C.C.—Pres.**, The Mayor. *Meetings*, Town Hall, Mondays, 8.0 p.m. *Sec.*, H. Jacobs, 95, Old Christchurch Road, Bournemouth.
- Bourneville C.C.—Pres.**, Frank Smyth. *Meetings*, Club Room, Dining Block, Bourneville Works, Mondays, 7.15 p.m., from September. *Sec.*, W. H. L. Minney, "Bickmarsh," Meadowfield Road, Rubery Nr. Birmingham.
- Bowes Park and District P.S.—Pres.**, J. Gorse. *Meetings*, Public Library, Wood Green, Tuesdays, 7.45 p.m. *Sec.*, J. H. Dundas, 83, Philip Lane, London, N. 15.
- Bradford P.S.—Pres.**, Alfred Greenwood. *Meetings*, College of Art and Crafts, Mondays, 7.30 p.m. *Sec.*, J. Marriner, 14, Beech Grove, Undercliffe, Bradford.
- Bradford (City) Co-operative C.C.—Pres.**, Stanley A. Smith. *Meetings*, 242, Manchester Road, Thursdays, 7.30 p.m. October to April. *Sec.*, John Lottey, 21, Musgrave Road, Eccleshill, Bradford.
- Brechin Photographic Association.—Pres.**, Wm. Shaw Adamson, J.P. *Meetings*, Mechanics' Institute, Alternate Thursdays, 8 p.m., from September. *Sec.*, R. C. Brown, "Denview," Brechin.
- Bridge of Allan and District P.S.—Pres.**, G. J. Hughes. *Meetings*, The Studio, First and Thir'd Mondays, 7.30 p.m. *Sec.*, Miss A. F. Souter, Netherby, Bridge of Allan.
- Brighouse Photographic and Naturalist Society.—Pres.**, O. Hingley. *Meetings*, Town Hall Buildings, Hall Street, Thursdays, 7.30 p.m., October to April. *Sec.*, H. Robinson, The Hives, Clifton, Brighouse.
- Brighton and Hove C.C.—Pres.**, F. Burfield Dyer. *Meetings*, 71, East Street, Brighton, Wednesdays. *Sec.*, A. F. Blackman, 322, Ditchling Road, Brighton.
- Bristol and West of England Amateur Photographic Association.—Pres.**, J. Cooke. *Meetings*, University and Literary Club, 20, Berkeley Square, Clifton, Second and Fourth Fridays, 8 p.m., October to Easter. *Sec.*, Mordaunt Miller, 7, All Saints Road, Clifton.
- Bristol P.S.—Pres.**, E. G. Watts. *Meetings*, Methven Brownlee Studios, 18, Charlotte Street, alternate Wednesdays, October to April, 7.30 p.m. *Sec.*, Miss N. Watts, 33, Seymour Road, Ashley Down, Bristol.
- Bristol.—Fry's Club (Photographic Section).—Pres.**, A. E. Cater. *Meetings*, Union Street, Second and Fourth Mondays; Somerdale, First and Thir'd Thursdays. *Sec.*, R. F. Wills, c/o J. S. Fry & Sons, Bristol.
- Britannic House Club, Art Section.—Pres.**, A. C. Hearn. *Meetings*, Britannic House, Finsbury Circus, E.C. 2, Thursdays, 6 p.m. *Sec.*, A. S. Gray, Britannic House, Finsbury Circus, E.C. 2.
- Bromley (Kent) C.C.—Pres.**, F. R. Ball. *Meetings*, Bromley Literary Institute, First and Thir'd Thursdays, 8 p.m., October to March. *Sec.*, H. E. Isard, Normanhurst, Holwood Road, Bromley, Kent.
- Burnley Mechanics' Institution C.C.—Pres.**, W. P. Brotherton, J.P. *Meetings*, Mechanics' Institution, Manchester Road, Alternate Tuesdays, 7.45 p.m. *Sec.*, A. Entwistle, 13, Godiva Street.
- Bury P.S.—Pres.**, J. H. Burton. *Meetings*, Athenæum, Market Street, Thursdays, 8 p.m. *Sec.*, Wm. Rhone, 127, Wilton Hill, Radcliffe, Manchester.
- Cambridge and District P.C.—Pres.**, R. Bellamy. *Meetings*, Club House, Ram Yard, Tuesdays, 7.30 p.m. *Sec.*, T. S. Moore, 135, Newmarket Road, Cambridge.
- Cambridge University C.C.—Pres.**, Prof. Sir Wm. Pope, M.A. *Meetings*, 10, Jesus Lane, Saturdays, 5.30 p.m. *Sec.*, I. H. H. Quibell, B.A., 51, Maid's Causeway, Cambridge.
- Cambuslang.—Giberfield Co-operative C.C.—Pres.**, G. Crichton. *Meetings*, 256, Hamilton Road, Cambuslang, Tuesdays, 7.30 p.m. *Sec.*, Thomas Clark, 31 Craigallan Avenue, Halfway, Cambuslang.
- Camera Club, The.—Meetings**, 17, John Street, Adelphi, W.C., Thursdays,

- 8.15 p.m. *Sec.*, H. H. Perry, 17, John Street, Adelphi, London, W.C. 2.
- Canterbury C.C.—Pres.**, Dr. R. Graham Wills. *Meetings*, Gaywoods Rooms, 41, High Street, Alternate Mondays, from October 3, 8 p.m. *Sec.*, Henry William Robinson, 35, Forty Acres Road.
- Cardiff C.C.—Pres.**, C. A. Williams, M.A., *Meetings*, Y.M.C.A., Queen Street, Thursdays, 7.45 p.m. *Sec.*, A. L. Morris, 49, Lansdowne Road, Canton, Cardiff.
- Cardiff Naturalists' Society (Photographic Section).—Pres.**, A. M. Hayward. *Meetings*, Engineers' Institute, Park Place. Alternate Tuesdays, 7.30 p.m., from October. *Sec.*, Aubrey H. Jenkins, "Aulda," Lake Road East, Cardiff.
- Carlisle and County Amateur P.S.—Pres.**, J. Sewell. *Meetings*, 9, Abbey Street, Alternate Wednesdays from October, 7.45 p.m. *Secs.*, C. A. Wynne, 8, Brookfield Gardens, and W. Sanderson, 26, Scotch Street, Carlisle.
- Castleford Y.M.C.A. P.S.—Meetings**, Y.M.C.A., Carlton Street, Fridays, 7.30 p.m. *Sec.*, H. Akeroyd, "Express" Office, Castleford.
- Chelmsford P.S.—Pres.**, Rev. C. Morrow. *Meetings*, School of Art, first Tuesday, 8 p.m. *Sec.*, S. E. Piper, c/o Boatman & Co., Market Road, Chelmsford.
- Chelsea P.S.—Pres.**, H. H. Wrench. *Meetings*, Chelsea Polytechnic, Manresa Road, Alternate Mondays, 8 p.m. *Sec.*, A. E. Beach, Shawfield Street, Chelsea, S.W. 3.
- Cheltenham Amateur P.S.—Pres.**, C. Streetfeild-James. *Meetings*, 3, Ormond Terrace, Alternate Wednesdays, 6.45 p.m., from October. *Sec.*, Fred Eager, 10, Leighton Road, Cheltenham.
- Cheltenham College P.S.—Pres. and Sec.**, A. B. Lloyd-Baker, M.A. *Meetings*, Physics Lecture Room.
- Cheltenham—Dean Close School P.S.—Pres.**, P. Bolton. *Meetings*, Science Laboratory. *Sec.*, R. M. Thomas, Dean Close School, Cheltenham.
- Chester Natural Science Society (Photographic Section).—Pres.**, G. E. Swift. *Meetings*, Grosvenor Museum, Thursday, 8 p.m., and First and Third Mondays. *Sec.*, H. Staton, 24, Churton Road, Chester.
- Chichester P.S.—Pres.**, F. B. Tompkins. *Meetings*, Flint House, South Street, *Sec.*, J. W. Barnes, Clyde House, Chichester.
- Chiltern Club of Arts P.S.—Pres.**, Mrs. Jopling-Rowe. *Sec.*, J. H. Jay, The Quinta, Elm Close, Amersham, Bucks.
- Chiswick General Sports Association P.S.—Pres.**, G. J. Shave. *Meetings*, Chiswick Works. *Sec.*, A. Barnes, L.G.O.C., Chiswick Works, Chiswick High Road, W. 4.
- Chorley P.S.—Pres.**, T. Hodgkinson. *Meetings*, 10, Park Road, Tuesdays, 8 p.m. *Sec.*, F. Sellers, Braystones, Queens Grove, Chorley.
- City of London and Cripplegate P.S.—Chairman**, J. J. Butler. *Meetings*, Cripplegate Institution, Golden Lane, E.C. 1, Mondays, 6.30 p.m., from October to May. *Sec.*, W. E. Ginger, 131, Hampstead Way, Golders Green, N.W. 11.
- Cleveland C.C.—Pres.**, Dr. A. Bryans. *Meetings*, St. George's Institute, Linthorpe Road, Middlesbrough, Alternate Tuesdays, 7.30 p.m. *Sec.*, Ian Ross, 97, Southfield Road, Middlesbrough.
- Clydebank—Singer C.C.—Pres.**, Jas. Robertson. *Meetings*, Singer Recreation Hall, Clydebank, Thursdays, 7.45 p.m. *Sec.*, John Simpson, 22, Cornock Crescent, Clydebank.
- Coatbridge Photographic Association.—Pres.**, W. Scott. *Meetings*, Carnegie Library, Academy Street, Thursdays, 7.30 p.m., from October 13th. *Sec.*, H. Peat, 21, Blairhill Street, Coatbridge.
- Coatbridge Co-operative C.C.—Pres.**, Andrew McNaught. *Meetings*, Co-operative Library Hall, Second Thursdays, 7.30 p.m. *Sec.*, Robert B. Hunter, 91, Alexander Street, Coatbridge.
- Colne C.C.—Pres.**, J. S. Gaulkroger. *Meetings*, Vivary Buildings, Spring Lane, Fridays, 8 p.m. *Sec.*, W. Hartley, 6, Grosvenor Street, Colne, Lancs.
- Coventry P.C.—Pres.**, H. G. Wagstaff. *Meetings*, Y.M.C.A., The Quadrant, Wednesdays—7.45 p.m. *Sec.*, P. W. Thompson, Lansdowne Place, Warwick Road, Coventry.
- Coventry.—Armstrong-Siddleley P.C.—Pres.**, J. D. Siddleley. *Meetings*, Armstrong-Siddleley Social Club, Mondays, 8 p.m. *Sec.*, P. F. Altree. Armstrong-Siddleley Athletic and Social Club, Parkside, Coventry.
- Cowlairs Co-operative C.C.—Pres.**, J. MacFarlane. *Meetings*, Kemp Street, Springburn, Glasgow, Fridays, 8 p.m. *Sec.*, John Evans, 158, Cockmuir Street, Balornock, Glasgow, N.
- Croydon C.C.—Pres.**, D. C. Rowlett. *Meetings*, Phoenix House, 128A, George Street, Wednesdays, 8 p.m. *Sec.*, A. E. Witty, 18, Howden Road, South Norwood, London, S.E. 25.
- C.T.O. Art Society.—Pres.**, J. Stuart Jones. *Meetings*, Irregular. *Sec.*, (Photographic), E. J. Shaw, 7, Summerlee Gardens, E. Finchley, N. 2.
- Culcheth C.C.—Pres.**, C. W. Godbert, M.A., J.P. *Meetings*, Culcheth School, Droylsden Road, Newton Heath, Third Mondays, 7.30 p.m. *Sec.*, A. Lindley, 18, Derbyshire Road, Clayton Bridge, Manchester.

- Dalry C.C.**—*Pres.*, John Logan. *Meetings*, 10, New Street, Wednesdays, 7.30 p.m. *Sec.*, H. Morrison, 7, James Street, Dalry, Ayrshire.
- Dartford P.S.**—*Meetings*, 21, High Street, Thursdays, 7.30 p.m. *Sec.*, H. S. Targett, 21, High Street.
- Dartford-Hallford P.C.**—*Pres.*, Everard Hesketh. *Meetings*, irregular. *Sec.*, G. Melville-Bell, J. & E. Hall, Ltd., Dartford Ironworks, Dartford, Kent.
- Darwen Photographic Association.**—*Meetings*, Club Room, 35, Bridge Street, Wednesdays, 8 p.m. *Sec.*, J. Croft, 75, Greenway Street, Darwen.
- Dennistoun Amateur Photographic Association.**—*Pres.*, J. Macdonald. *Meetings*, 27, Hillfoot Street, Wednesdays, 8 p.m. *Sec.*, David Phin, 290, Cumbernauld Road, Glasgow, E. 1.
- Denstone College P.S.**—*Sec.*, A. W. Huskinson, B.Sc., Denstone College, Staffs.
- Deptford and District C.C.**—*Pres.*, C. W. Hovey. *Meetings*, D.M.I., Clyde Street, Fridays, 8 p.m. *Sec.*, E. A. C. Moon, 36, St. Johns Vale, London, S.E. 8.
- Derby Photographic Society.**—*Pres.*, H. A. Wallace. *Meetings*, 44, Groen Lane, Mondays, bi-monthly, 7.30 p.m. *Sec.*, F. E. Birks, 16, Leacroft Road, Derby.
- Derby Railway Institute P.S.**—*Pres.*, H. Jones. *Meetings*, Derby Railway Institute. *Sec.*, J. E. Greaves.
- Desborough and District P.S.**—*Pres.*, T. Clipston. *Meetings*, Manor House Buildings, Fridays, 7.45 p.m. *Sec.*, A. Bassett, 9, Alexandra Road, Desborough, Northants.
- Dewsbury P.S.**—*Pres.*, J. Marsden. *Meetings*, Moot Hall, Church Street, Mondays, 8 p.m. *Sec.*, Albert Lyles, Holm Lea, Park Road, Dewsbury.
- Doncaster C.C.**—*Pres.*, F. A. Jordan. *Meetings*, Y.M.C.A. Central, Alternate Tuesdays, October to April. *Sec.*, Miss M. Shepherd, 4, St. Mary's Road, Doncaster.
- Dorking C.C.**—*Meetings*, Cliftonville, Tuesdays, 7.30 p.m. *Sec.*, E. Waymark, Cliftonville, Dorking.
- Dover Institute C.C.**—*Pres.*, C. E. Beaufoy. *Meetings*, The Institute, Alternate Fridays, 8 p.m. *Sec.*, H. Garland, 72, Elms Vale Road, Dover.
- Dukinfield P.S.**—*Pres.*, Isaac Wright. *Meetings*, 103, Astley Street, Wednesdays, 8.30 p.m. *Sec.*, L. J. Scott, 33, The Hollins, Stalybridge, Cheshire.
- Dulwich College P.S.**—*Pres.*, E. J. Coleman. *Meetings*, Dulwich College, irregular. *Sec.*, S. E. White, Dulwich College, S.E. 21.
- Dundee and East of Scotland Photographic Association.**—*Meetings*, Club Room, Y.M.C.A. Buildings, Dundee, First Thursdays, from October to April, 7.45 p.m. *Sec.*, James Slater, Rosemount, Camphill Road, Broughty Ferry.
- Dunfermline Photographic Association.**—*Pres.*, M. B. Jackson. *Meetings*, Filmmuir Hall, Tuesdays, 7.30 p.m. *Sec.*, R. Steedman, 14, Viewfield Terrace.
- Dunfermline Naturalists' Society (Photographic Section).**—*Pres.*, James Mackie. *Meetings*, Abbot's House, Abbot Street, First and Third Tuesdays, 7.30 p.m. *Sec.*, Jas. B. Begg, c/o Leighton, 1, Elliot Hill Street, Dunfermline.
- Ealing P.S.**—*Pres.*, W. H. Ashbee. *Meetings*, Town Hall, Second and Fourth Wednesdays, 8.0 p.m. *Sec.*, A. S. Kirbyshire, M.A., 5, Cairn Avenue, Ealing, W. 5.
- Ealing County School P.S.**—*Pres.*, W. J. Dudman, B.Sc. *Meetings*, Ealing County School for Boys, Wednesdays, 4.20 p.m. *Sec.*, D. M. Roberts, M.A., The County School, Ealing, London, W. 5.
- Eastbourne P.S.**—*Meetings*, Technical Institute, Thursdays, 8 p.m. *Sec.*, H. R. Hudson, "Jesmond," Arlington Road, Eastbourne.
- Eastbourne Natural History, Photographic and Literary Society.**—*Meetings*, Technical Institute Thursdays, 8.0 p.m. *Sec.*, F. Plowright, Downs Edge, Cliff Road, Eastbourne.
- Edinburgh P.S.**—*Pres.*, P. T. Mackintosh. *Meetings*, 16, Royal Terrace, First and Third Wednesdays, October to April, 8 p.m. *Sec.*, T. A. Mowat, 16, Royal Terrace, Edinburgh.
- Edinburgh P.C.**—*Pres.*, G. W. Wight. *Meetings*, 16, Royal Terrace, Second Thursdays, October to May, 8 p.m. *Sec.*, B. Sherratt, 8, Castle Terrace, Edinburgh.
- Edinburgh.—Heriot C.C.**—*Pres.*, A. Hardie. *Meetings*, George Heriot's School, Alternate Fridays.
- Erdington and District P.S.**—*Pres.*, H. J. Trueman. *Meetings*, The Church House, High Street, Mondays, 8 p.m. *Sec.*, H. C. Chamberlin, "Kencelm," Grange Road, Erdington, Birmingham.
- Exeter C.C.**—*Pres.*, W. T. Aivolet. *Meetings*, Rougemont House, Tuesdays, from October 7th. *Sec.*, Miss A. F. Nicholls, 5, Baker Street, Heavitree, Exeter.
- Fairey Aviation C.C.**—*Pres.*, C. R. Fairey. *Meetings*, The Canteen, Fairey Aviation Co., Hayes, Alternate Mondays, 5.30 p.m. *Sec.*, J. T. Morton, 46, Lees Road, Hillingdon, Middlesex.
- Fakenham Literary, Field and C.C.**—*Pres.*, G. Bales. *Meetings*, Church Institute, Tuesdays, 8 p.m. *Sec.*, J. C. Holton, next P.O., Fakenham.
- Forest Hill and District P.S.**—*Pres.*, A. W. Walker. *Meetings*, Central Hall, Forest Hill, Tuesdays, 8 p.m., from October to April. *Sec.*, Geo. A. Slight, 18, Ewelme Road, Forest Hill, S.E. 23.

- Garswood Hall Collieries Institute C.C.—***Pres.*, J. H. Edmonson. *Meetings*, Institute, Wednesdays, 7.30 p.m. *Sec.*, W. H. Berry, 383, Old Road, Ashton-in-Makerfield, near Wigan.
- Gateshead and District C.C.—***Pres.*, J. Donaldson. *Meetings*, Gateshead Industrial Co-operative Societies Hall, Whitehall Room, Alternate Thursdays 7.30 p.m. *Sec.*, A. MacDonald, 89, Whitefield Terrace, Heaton, Newcastle-on-Tyne.
- Glasgow.—**See also Cowlairst, Dennistoun, Hallside, Partick, Rutherglen, Sheettleston.
- Glasgow and West of Scotland Photographic Association.—***Pres.*, Walter Gillespie. *Meetings*, 180, West Regent Street, Glasgow, Mondays, 8 p.m. *Sec.*, G. Hunter Martin, 114, West Campbell Street, Glasgow.
- Glasgow and District Photographic Inter-Club Committee.—***Pres.*, Dan MacDonald. *Sec.*, John Baird, 25, Herriet Street, Glasgow, S. 1.
- Glasgow.—Allan Glen's School C.C.—***Pres.*, James H. Steel, M.A. *Meetings*, Allan Glen's School, Second or Third Tuesdays, 3.40 p.m. *Sec.*, W. Allan, M.A., Allan Glen's School, Glasgow.
- Glasgow.—Barr and Stroud C.C.—***Pres.*, Neil J. Maclean, B.Sc. *Sec.*, J. M. Taylor, Messrs. Barr and Stroud, Ltd., Anniesland, Glasgow, W. 3.
- Glasgow.—Beardmore (Parkhead) P.S.—***Pres.*, H. Monks. *Meetings*, East Wellington Street, Parkhead, Fridays, 7.30 p.m. *Sec.*, Robert Blount, 9, St. Mark Street, Shettleston, Glasgow.
- Glasgow.—Cockburns Cardonald C.C.—***Pres.*, Thos. Grant. *Sec.*, Hugh Taylor, 3, Muslin Street, Glasgow, S.E.
- Glasgow Corporation Transport C.C.—***Meetings*, Hayburn Street, Partick. *Sec.*, James A. B. Harley, 65, Dumbarton Road, Partick, Glasgow.
- Glasgow.—Eclipse C.C.—***Pres.*, Alex Cairns. *Meetings*, Canteen, Darnick Street, Glasgow, First and Third Wednesdays, 8 p.m. *Sec.*, Wm. Shields, 22, Leckethill Street, Springburn, Glasgow.
- Glasgow Epphatha C.C.—***Pres.*, R. Scott. *Meetings*, Royal Institute, 158, West Regent Street, Mondays, 8 p.m. *Sec.*, W. G. E. Kirker, 23, Vicarfield Street, Glasgow, S.W. 1.
- Glasgow.—St. George Co-operative C.C.—***Pres.*, A. Osterberg. *Meetings*, 40, Gladstone Street, Mondays from October 5th, 8 p.m. *Sec.*, D. Macvarish, 24, Doyer Street, Glasgow, C. 3.
- Glasgow (South) C.C.—***Pres.*, John Baird. *Meetings*, 43, Bankhall Street, Govanhill, Tuesdays, 8 p.m. *Sec.*, J. L. Bannatyne, 42, Mansewood Road, Mansewood, Glasgow, S. 3.
- Glasgow.—S.C.W.S. Welfare C.C.—***Pres.*, R. H. Wylie. *Meetings*, 119, Paisley Road, Alternate Mondays. *Sec.* Robert Philip, 29, St. Kenneth Drive, Glasgow, S.W. 1.
- Glasgow—Templeton C.C.—***Pres.*, John Lamb. *Meetings*, Templeton Club, Glasgow, First Tuesdays, 7.45 p.m. *Sec.*, R. J. Williamson, 155, Mordaunt Street, Glasgow, S.E.
- Glasgow.—U.C.B.S. C.C.—***Pres.*, J. McCulloch. *Meetings*, 150, Moffat Street, Mondays, 8 p.m. *Sec.*, J. Milliken, 7, Richmond Drive, Eastfield, Rutherglen.
- Glasgow Y.M.C.A. C.C.—***Pres.*, J. G. Aitken. *Meetings*, Central Y.M.C.A., Mondays, 8 p.m. *Sec.*, D. Gilchrist, 201, Kent Road, Sandyford, Glasgow.
- Glyn's House Club.—***Pres.*, L. Currie. *Sec.*, R. W. Martin, 42, Gracechurch Street, London, E.C. 3.
- G.P.O. Arts Club (Photographic Section).—***Pres.*, H. M. Postmaster-General. *Sec.*, G. J. R. Holt, "Cartref," 2, Nelson Road, South Chingford, E. 4.
- Grangemouth P.C.—***Pres.*, Robert Marshall. *Meetings*, Y.M.C.A., First Fridays, 8 p.m. *Sec.*, John P. Munn, 15, Jackson Avenue, Grangemouth.
- Gravesend and District P.S.—***Pres.*, J. T. Dalladay. *Meetings*, Technical Institute, Gravesend, alternate Mondays, 7.30 p.m. *Sec.*, H. S. Wheeler, 170, Upper Wrotham Road, Gravesend.
- Grays.—Palmer's School P.S.—***Pres.*, Rev. H. A. Abbott, M.A. *Meetings*, Alternate Fridays, 3.45 p.m. *Sec.*, F. Newsome, M.A., Palmer's School, Grays, Essex.
- Greenock C.C.—***Pres.*, Samuel Turkington. *Meetings*, 21, Kieblain Street, Thursdays 8 p.m. *Sec.*, E. R. Auld, 9, Manor Crescent, Gourock, Renfrewshire.
- Guernsey P.S.—***Pres.*, C. H. Toms. *Meetings*, Guille-Alles Library, First Mondays, winter, 8 p.m., First Thursdays, summer. *Sec.*, L. Robilliard, Richmond Avenue, Guernsey.
- Guildford and District C.C.—***Pres.*, E. H. Lee. *Meetings*, The Institute, Ward Street, Guildford, Alternate Tuesdays, October to April, 8 p.m. *Sec.*, Miss D. Elliott, 45, Agraria Road, Guildford.
- Guy's Hospital Nurses' P.S.—***Pres.*, Miss E. E. P. MacManus. *Meetings*, Nurses' Home, Guy's Hospital. *Sec.*, Miss M. Smith, Guy's Hospital, London, S.E. 1.
- G.W.R. Literary Society (Photographic Section).—***Meetings*, 44, Eastbourne Terrace, Paddington, W. 2.
- Hackney P.S.—***Pres.*, Harold Rose. *Meetings*, Hackney Baths, Tuesdays, 8 p.m. *Sec.*, Walter Selve, 24, Pembury Road, Clapton, London, E. 5.
- Halifax P.S.—***Pres.*, Percy S. Colledge. *Meetings*, 4A, Bedford Square, Tuesdays October to April; Second Tuesdays,

- April to October, 7.30 p.m. *Sec.*, A. Wheeldon, St. Luke's Hospital, Halifax.
- Halifax Y.M.C.A. Photographic Section.**—*Pres.*, J. Eastwood. *Meetings*, Y.M.C.A., Clare Hall, Fridays, 7.30 p.m. *Sec.*, G. Gordon, Clare Hall, Halifax.
- Hallside C.C.**—*Pres.*, Joseph Harley. *Meetings*, Victoria Hall, Fridays, 7.30 p.m. *Sec.*, William Boyd, 287, Hamilton Road, Halfway, Cambuslang.
- Hamilton P.S.**—*Pres.*, W. S. Hamilton. *Meetings*, Public Library, Cadzow Street. *Sec.*, J. B. Steel, 20, Burnblea Street, Hamilton, Scotland.
- Hammersmith.—Hampshire House P.S.**—*Pres.*, T. R. Clemo. *Meetings*, Hampshire House, Hog Lane, King Street, Thursdays, 8 p.m. *Sec.*, Miss R. Noble, 3, Strauss Road, London, W. 4.
- Hanley P.S.**—*Pres.*, F. W. Shenton. *Meetings*, Y.M.C.A., Marsh Street, Mondays, 7.45 p.m. October to March. *Sec.*, G. T. Boulton, Hallwater Villas, Ednonton.
- Hanley High School P.S.**—*Pres.*, E. G. Laws, M.A. *Meetings*, Lecture Theatre, Hanley High School, 4.30 p.m. *Secs.*, R. W. A. Burgess, B.Sc., and N. Miles, Hanley High School, Stoke-on-Trent.
- Harrogate P.S.**—*Pres.*, W. A. Hebden. *Meetings*, Church Institute, Fridays, October to April, 8 p.m. *Sec.*, H. C. Buckle, 43, Burke Street, Harrogate.
- Haslemere and District C.C.**—*Pres.*, W. E. Muir. *Meetings*, Educational Museum, occasionally. *Sec.*, E. W. Swanton, Museum, Haslemere.
- Hebden Bridge P.S.**—*Pres.*, Ben Stansfield. *Meetings*, Grammar School, Second Saturdays, 7 p.m., from October 8. *Sec.*, Edward B. Gibson, Croft Terrace, Hebden Bridge.
- Herrington Burn Y.M.C.A. C.C.**—*Meetings*, Y.M.C.A., Tuesdays, 7 p.m. *Sec.*, George H. Lowdon, Y.M.C.A., Herrington Burn, Co. Durham.
- Horbury C.C.**—*Pres.*, Rev. E. E. C. Elford. *Meetings*, St. Mary's Hall, Horbury Junction, Tuesdays, 7.30 p.m. *Sec.*, G. A. Kilner, Industrial Street, Horbury Junction.
- Hornsea, P.S.**—*Pres.*, Alan Johnston. *Meetings*, Wednesdays, 7.30 p.m. *Sec.*, Thos. C. Wise, 2, Cliff Terrace, Hornsea, Yorks.
- Horsforth P.S.**—*Pres.*, Herbert Dogsdon. *Meetings*, Mechanics' Institute, Thursdays, 7.30 p.m. *Sec.*, Arthur Hague, 89, Outwood Lane, Horsforth, Leeds.
- Horsham—Christ's Hospital Natural History Society (Photographic Section).**—*Pres.*, L. W. Tidmarsh, M.A. *Meetings*, Christ's Hospital, monthly. *Sec.*, W. A. Edward, Lamo A, Christ's Hospital, Horsham, Sussex.
- Horwich Institute Amateur P.S.**—*Pres.*, S. H. Whitelegg. *Meetings*, Mechanics' Institute. *Sec.*, J. Kay, 25, Catherine Street East, Horwich.
- Hucknall and District P.S.**—*Pres.*, Dr. R. H. Vartan. *Meetings*, Y.M.C.A., Alternate Mondays, 7 p.m. *Sec.*, Leonard Asbury, Normandene, Storth Avenue, Hucknall, Notts.
- Huddersfield Naturalist Photographic and Antiquarian Society.**—*Pres.*, J. Hadfield. *Meetings*, Technical College and Byram Arcade, Alternate Thursdays, 7.30 p.m., and Fridays, 7.30 p.m. *Sec.*, H. H. Charlesworth, 61, Rawthorpe Lane, Dalton, Huddersfield.
- Hull P.S.**—*Pres.*, R. E. Booth. *Meetings*, Photographic Hall, Grey Street, Park Street, Thursdays, 8 p.m., and Fridays, 7 p.m. *Sec.*, Alfred Dyer, 25, Parkfield Drive, Newington, Hull.
- Hygeia C.C.**—*Pres.*, T. Lindsay. *Meetings*, Ministry of Health, Whitehall, S.W. 1. Mondays, 5.30 p.m. *Sec.*, H. G. Ledger, 274, Cricklewood Lane, London, N.W. 2.
- Ilford P.S.**—*Pres.*, E. J. Lines. *Meetings*, Cecil Hall, Park Avenue. Wednesdays, 8 p.m. *Sec.*, Miss F. M. Farnes, 78, Abbotford Gardens, Woodford Green, Essex.
- Ilkeston Arts Club.**—*Pres.*, The Mayor. *Meetings*, Public Library, Fridays. *Sec.*, Arthur Smith, B.Sc., 31, Lower Stanton Road, Ilkeston.
- Inland Revenue P.S.**—*Pres.*, Sir James Grigg, K.C.B. *Meetings*, York House, Kingsway, W.C. Alternate Tuesdays and Wednesdays, fortnightly, 5.30 p.m. *Sec.*, H. C. V. Rout, Room 127, New Wing, Somerset House, W.C. 2.
- Ipswich and District P.S.**—*Pres.*, Arthur Woolford. *Meetings*, Ipswich Museum, alternate Mondays, 7.30 p.m. *Sec.*, F. G. Mallet, 95, Belle View Road, Ipswich.
- Ipswich and District Natural History Society.**—*Pres.*, W. K. Spencer, D.Sc. *Meetings*, The Museum, Alternate Saturdays, 8 p.m. *Sec.*, H. E. P. Spencer, The Museum, Ipswich.
- Isle of Thanet Amateur P.S.**—*Pres.*, E. G. Hicks. *Secs.*, F. H. Treweek and G. W. Norris, 37, Queen Street, Ramsgate.
- John Ruskin C.C.**—*Pres.*, Leslie Wyatt. *Meetings*, Walworth Men's Institute, Beresford Street, S.E. 17. *Sec.*, George Paul, 229, Brixton Hill, London, S.W. 2.
- Keighley and District Photographic Association.**—*Pres.*, J. W. Arnold. *Meetings*, Devonshire Chambers, 70, North Street, Thursdays, 7.30 p.m. *Sec.*, H. Bottomley, Hurst Lea, Wilsden, near Bradford.
- Keith Field Club (Photographic).**—*Pres.*, William Robb. *Meetings*, Institute

- Buildings, First and Third Mondays, 8 p.m. *Sec.*, John Pirie, 63, Moss Street, Keith.
- Kendal P.S.—Pres.**, Dr. Cockill. *Meetings*, Public Library, Tuesdays, 7.15 p.m. *Sec.*, H. F. Alsop, 30, Highgate, Kendal.
- Kennaway P.S.—Pres.**, Rev. E. F. E. Wigram. *Meetings*, 6, Salisbury Square, E.C.4. *Sec.*, A. S. Brine, 6, Salisbury Square, London, E.C.4.
- Kew (Ministry of Labour) C.C.—Pres.**, E. Darison. *Meetings*, as arranged. *Sec.*, N. M. T. Martin, Examination Division, Ministry of Labour, Kew.
- Kidderminster and District P.S.—Pres.**, P. G. Hoppercroft. *Meetings*, Kingsley Hall, Vicar Street, Mondays, October to April, 8 p.m. *Sec.*, E. G. Cowderoy, 11, Prospect Lane, Kidderminster, and I. N. Rogers, 11, Vicar Street, Kidderminster.
- Kilburn and Willesden P.S.—Meetings**, Willesden Polytechnic, Priory Park Road, Kilburn, Tuesdays, 7.30 p.m., October to April. *Sec.*, H. F. James, 59, Okehampton Road, Kensal Rise, London, N.W.10.
- Kingston-on-Thames and District P.S.—Pres.**, Rev. Canon J. Hasloch Potter, M.A. *Meetings*, Public Library, Kingston-on-Thames, fortnightly, 8 p.m. *Sec.*, V. W. Banks, 1, Cadogan Road, Surbiton.
- Kinning Park Co-operative Society C.C.—Meetings**, Co-operative Hall, 18, Coburg Street, Glasgow, Alternate Thursdays, 8 p.m. *Sec.*, Dan McLachlan, 21, Weir Street, Glasgow, C. 5.
- Kirkcaldy P.S.—Pres.**, James Ross. *Meetings*, War Memorial Buildings, Mondays, 7.30 p.m. *Sec.*, George S. Gourlay, 74, Balfour Street, Kirkcaldy.
- Kodak Staff P.S.—Chairman**, R. Kershaw. *Sec.*, J. M. Hoffmeister, Kodak Ltd., Kingsway, London, W.C.2.
- Kodak Works P.S.—Pres.**, W. E. Webb. *Meetings*, Kodak Works, Wednesdays, 7.30 p.m. *Sec.*, S. W. Bird, Kodak Ltd., Wealdstone.
- Leamington and District P.S.—Pres.**, Rayno Coole. *Meetings*, 19, Parade, Leamington, alternate Tuesdays from September to April, 8 p.m. *Sec.*, A. W. Payne, 74, Cape Road, Warwick.
- Leeds C.C.—Pres.**, W. Scruton. *Meetings*, Leeds Institute, Cookridge Street, Mondays, 7.30 p.m. *Sec.*, A. P. Westerman, 12, Nunington Street, Armley, Leeds.
- Leeds P.S.—Pres.**, David Holmes. *Meetings*, Leeds Institute, Tuesdays, 7.30 p.m., October to April. *Sec.*, W. Rider, 268, Dewsbury Road, Leeds.
- Leeds University P.S.—Pres.**, Dr. R. B. Forster. *Meetings*, The University, alternate Mondays, 5.30 p.m. *Sec.*, R. S. Illingworth, The Medical School, Leeds.
- Leek P.S.—Pres.**, F. Downes, J.P. *Meetings*, Wesleyan Institute, Clark's Bank, Mondays, 8 p.m. *Sec.*, W. Crawshaw, 21, Garden Street, Leek, Staff.
- Leicester and Leicestershire P.S.—Pres.**, O. W. Seville. *Meetings*, Foresters' Institute, St. Nicholas Street. Wednesdays, 7.30 p.m. *Sec.*, R. A. Fathers, 26, Collingham Road, Leicester.
- Leighton Buzzard P.S.—Pres.**, R. Richmond. *Meetings*, Ye-Old-Vic., first Fridays. *Sec.*, Ernest J. Cook, Virginia, Stanbridge Road, Leighton Buzzard.
- Leith C.C.—Pres.**, F. Clayton. *Meetings*, 6, Charlotte Street, Tuesdays, 8 p.m., October to April. *Sec.*, S. Campbell, 57, McDonald Road, Edinburgh.
- Letchworth C.C.—Pres.**, D. W. Brunt. *Meetings*, Museum Buildings, Thursdays, 8 p.m. *Sec.*, Harry Meyer, 5, Souberie Avenue, Letchworth.
- Lewes Scientific Society (Photographic Section).—Meetings**, St. Wilfrids House, Second and Fourth Mondays, October to April. *Sec.*, R. Lawson Russell, 178, High Street, Lewes.
- Leytonstone and Wanstead C.C.—Pres.**, L. V. Jessop. *Meetings*, Wesleyan Church Parlour, High Road, Leytonstone. *Sec.*, C. G. Westlake, 12, Lilian Gardens, Woodford, E. 18.
- Lincoln C.C.—Pres.**, J. Scully. *Meetings*, Public Library. *Sec.*, Miss G. W. Cave, 60, Richmond Road, Lincoln.
- Liverpool Amateur Photographic Association.—Pres.**, Willis Nevitt. *Meetings*, 14, Bluecoat Chambers, School Lane, Tuesdays and Thursdays, October to March, 7.45 p.m. *Sec.*, R. M. Williams, 14, Bluecoat Chambers, School Lane, Liverpool.
- Liverpool Central Y.M.C.A. C.C.—Meetings**, Y.M.C.A., Mount Pleasant, Second Tuesdays, 8 p.m. *Sec.*, J. Graham, 12, Birch Road, Oxtou, Birkenhead.
- Liverpool-Victoria P.S.—Pres.**, F. J. Carter. *Sec.*, E. Cooke, Victoria House, Southampton Row, London, W.C.1.
- Llanelli Y.M.C.A. P.S.—Pres.**, C. G. Millar. *Meetings*, Y.M.C.A., Fridays, 8 p.m. *Sec.*, G. J. Jones, 11, Bigyn Road, Llanelli.
- L.M.S. (London) P.S.—Pres.**, E. B. Fielden, M.P. *Meetings*, Euston Headquarters, Wednesdays, 5.30 p.m. *Sec.*, J. T. White, St. Pancras Hotel, London, N.W.1.
- London and Lancashire P.S.—Pres.**, F. W. Pascoe Rutter. *Meetings*, 7, Chancery Lane, W.C.2, irregular. *Sec.*, H. Stephen, 33, Thurby Road, Wembley, Middlesex.
- London County Council Staff C.C.—Pres.**, W. H. Fitzgerald. *Meetings*, County Hall, Westminster Bridge, S.E.1.

- First and Third Mondays, 6 p.m. *Sec.*, F. W. Hyde, Clerk's Dept., County Hall, S.E. 1.
- Loughborough P.S.**—*Pres.*, W. F. Charles, *Meetings*, Tudor Hall, Southfield Road, alternate Thursdays, 7.45 p.m. *Sec.*, D. F. Storer, 22, Baxter Gate, Loughborough.
- Maidstone and District P.S.**—*Pres.*, J. E. Austin, *Meetings*, Church Institute, Maidstone, Mondays, 7.30 p.m. *Sec.*, E. C. Wood, 17, Salisbury Road, Maidstone.
- Manchester Amateur P.S.**—*Pres.*, T. P. Threlkeld, *Meetings*, Manchester Social Club Buildings, Lower Mosley Street, Tuesdays, 7.30 p.m. *Sec.*, Harry Chapman, 35, Radstock Road, Stretford, Nr. Manchester.
- Manchester P.S.**—*Pres.*, C. B. Monaghan, *Meetings*, Milton Hall, Deansgate, Second Mondays, September to May, 7.0 p.m. *Sec.*, H. C. Milligan, "Scarsdale," Barkers Lane, Ashton-on-Mersey.
- Manchester.—British Dyestuffs Corporation P.S.**—*Pres.*, C. J. T. Cronshaw, *M.Sc. Meetings*, The Club House, Blackley, Manchester. *Sec.*, J. R. Maddocks, Blackley Works, Manchester.
- Manchester.—Chloride C.C.**—*Meetings*, Irregular. *Sec.*, V. Kay, Chloride Electrical Storage Co., Ltd., Clifton Junction, near Manchester.
- Manchester.—Simpson Memorial C.C.**—*Pres.*, Dr. A. T. Lakin, *Meetings*, Simpson Memorial Institute, Moston, Fridays, 8 p.m. *Sec.*, T. H. Wakefield, Simpson Memorial Institute, Moston.
- Medway Amateur P.A.**—*Pres.*, H. F. Wingent, *Meetings*, Camera Cottage, Medway Street, Chatham, Thursdays. *Sec.*, R. C. Burton, 24, Windmill Road, Gillingham, Kent.
- Melbourne (Derbys.) P.S.**—*Pres.*, H. Dunningcliff, *Meetings*, Council Schools, Fridays, 8 p.m. *Sec.*, F. S. Tivey, Hythe, North Street, Melbourne, Derbys.
- Meridian C.C.**—*Pres.*, H. B. Rose, *Meetings*, Meridian Works, Haydn Road, Nottingham, Tuesdays, 6.30 p.m., October to March. *Sec.*, T. H. Knightall, Hillcrest, Trevor Road, West Bridgford, Notts.
- Metrogas P.S.**—*Pres.*, Dr. Charles Carpenter, *Meetings*, 709, Old Kent Road, S.E. 15, Tuesdays, 7 p.m. *Sec.*, A. E. Dadson, 709, Old Kent Road, London.
- Money Order Department P.S.**—*Pres.*, Col. D. J. Liddbury. *Sec.*, Miss P. K. Farrant, Money Order Department, Holloway, London, N. 7.
- Morecambe, Heysham and District P.S.**—*Pres.*, P. W. Ladmore, *Meetings*, Technical School, Morecambe, Fridays, 7.30 p.m. *Sec.*, N.C.B.H. Allen, York-shire Penny Bank, Ltd., Morecambe.
- Motherwell Y.M.C.A. C.C.**—*Pres.*, A. Webster, *Meetings*, Y.M.C.A., Thursdays, 8 p.m. *Sec.*, David Robertson, Rannoch, Avon Street, Motherwell.
- Mount Pleasant C.C.**—*Meetings*, Inland Section, G.P.O., E.C. 1. *Sec.*, G. H. Starforth, 126, Kyrle Road, S.W. 11.
- National Physical Laboratory C.C.**—Open only to N.P.L. Staff. *Meetings*, N.P.L. Tuesdays. *Sec.*, G. H. Glaysher, National Physical Laboratory, Teddington.
- Nelson C.C.**—*Pres.*, S. Nutter, *Meetings*, Forrest Street, Tuesdays, 8 p.m. *Sec.*, A. S. Birtwistle, 18, Alexander Street, Nelson, Lancs.
- Newcastle and Tyneside P.S.**—*Pres.*, Dr. G. R. East, *Meetings*, 58, Grey Street, Tuesdays, 7.15 p.m. *Sec.*, A. E. Lacey, Roseneath, Ponteland, Newcastle-on-Tyne.
- Newcastle-on-Tyne.**—**Armstrong Whitworth and Vickers-Armstrong's C.C.** *Pres.*, R. W. B. Billingham, *Meetings*, Elswick Works, Scotswood Road, Tuesdays, 6.30 p.m. *Sec.*, V.E.A. Magnus, Elswick Works, Newcastle-on-Tyne.
- Newcastle (Staffs.) and District C.C.**—*Pres.*, G. Griffiths, *Meetings*, Lecture Hall, Marsh Street, Mondays, 7.30 p.m. *Sec.*, E. B. Marks, Aalsmeer, Regent Street, Stoke-on-Trent.
- Northants Natural History Society (Photographic Section).**—*Pres.*, C. H. Dorman, *Meetings*, 32, Bridge Street, Northampton, as arranged, 8 p.m. *Sec.*, A. E. Tyrrell, "Aysgarth," 179, Birchfield Road East, Northampton.
- North London C.C.**—*Pres.*, T. J. Drakeley, *D.Sc. Meetings*, Northern Polytechnic, Holloway Road. *Sec.*, L. Gregory, 21, Dawlish Avenue, London, N. 13.
- North Middlesex P.S.**—*Pres.*, H. L. Wallis, *Meetings*, Mount View Congregational Church Hall, Stroud Green, Thursdays, 8 p.m. *Sec.*, Miss M. E. Blake, 112, Crouch Hill, London, N. 8.
- North West Postal P.S.**—*Meetings*, North West District Office, London, Thursdays, 7 p.m. *Sec.*, Chas. A. Dunning, N.W.D.O., London, N.W. 1.
- Norwich and District P.S.**—*Pres.*, Miss E. M. Colman, *Meetings*, Public Library, First and Third Tuesdays, 7.15 p.m. *Sec.*, Richard J. Delf, 41, Park Lane, Norwich.
- Nottingham and Notts P.S.**—*Pres.*, E. A. Pollard, *Meetings*, Mechanics' Institute, Nottingham, Alternate Tuesdays, from September, 8.0, 7.45 p.m. *Sec.*, Alfred Fisher, 6, Gregory Avenue, Lenton, Nottingham.
- Nottm. High School P.S.**—*Pres.*, C. L. Reynolds, M.A. *Meetings*, High School,

- Wednesdays, 4.15 p.m. *Sec.*, J. R. West, High School, Nottingham.
- Oakham School P.S.**—*Pres.*, H. A. Anderson. *Meetings*, as arranged. *Sec.*, J. G. Cutts, School House, Oakham.
- Oldbury.—Fortress P.C.**—*Pres.*, C. F. Bristol. *Meetings*, Chance & Hunt, Ltd., Social Club, Park Lane, Wednesdays, 8 p.m. *Sec.*, Chas. Lewis, 25, Bromford Road.
- Oldham P.S.**—*Pres.*, G. H. Rider. *Meetings*, Y.M.C.A., Thursdays, 7.45 p.m. *Sec.*, Joseph Dixon, 81, Ward Street, Oldham, Lancashire.
- Oldham Equitable P.S.**—*Pres.*, J. E. Downing. *Meetings*, Hope Street, Mondays, 7.45 p.m. *Sec.*, C. Wild, 9, Paulden Street, Waterhead, Oldham.
- Orrell P.S.**—*Pres.*, A. Matheson. M.B. *Meetings*, Council Chambers. *Sec.*, J. Blackburn, 3, Portland Street, Spring Bank, Wigan.
- Oxford P.S.**—*Pres.*, A. C. Egerton, M.A. *Meetings*, Y.M.C.A., Alternate Mondays, 8 p.m. *Sec.*, H. R. F. Sturch, "Hopewell," Elms Road, Botley, Oxford.
- Paisley Philosophical Institution (Photographic Section).**—*Pres.*, R. C. Macintosh. *Meetings*, 55, Oakshaw Street, Fridays, 8 p.m. *Sec.*, Maxwell Bryce, 51, Caledonia Street, Paisley.
- Partick C.C.**—*Pres.*, J. McPhail, M.A. *Meetings*, 51A, Peel Street, Wednesdays, 8 p.m. *Sec.*, William G. Waterfield, 51A, Peel Street, Partick.
- Pearl P.S.**—*Pres.*, A. Jaques. *Meetings*, 252, High Holborn, Mondays, 5.45 p.m. *Sec.*, E. G. Watts, 252, High Holborn, London, W.C.1.
- Perthshire Society of Natural Science.**—*Pres.*, Edward Smart, B.Sc. *Meetings*, Museum, Tay Street, Perth, Second Fridays, November to April, 7.30 p.m. *Sec.*, John Ritchie, Museum, Perth.
- Peterborough P.S.**—*Meetings*, Museum, Priestgate, Alternate Tuesdays, 7.30 p.m. *Sec.*, P. G. Field, 79, Taverners Road.
- Photomicrographic Society.**—*Pres.*, C. H. Caffyn. *Meetings*, 4, Fetter Lane, E.C. 4, First and Third Fridays, from October to May, 7 p.m. *Sec.*, J. G. Bradbury, 1, Hogarth Hill, Golders Green, N.W.11.
- Plymouth Institution and Devon & Cornwall Natural History Society (Photographic Section).**—*Pres.*, B. C. R. Haddow. *Meetings*, Athenæum, George Street, Plymouth, Alternate Mondays from October 10th, 7.30 p.m. *Sec.*, W. Ernest Vandall, 15, Anns Place, Devonport.
- Polytechnic P.S.**—*Pres.*, F. Jackson. *Meetings*, The Polytechnic, Fridays, 6 p.m. *Sec.*, Stanley H. Shand, 117, Park Street, Regent's Park.
- Pontefract P.S.**—*Pres.*, Capt. P. Bentley, M.C. *Meetings*, 18, Beasfaiir, Wednesdays, 7.30 p.m. *Sec.*, S. G. Nicholls, Beechwood Avenue, Pontefract.
- Pontypridd and District Y.M.C.A. C.C.**—*Pres.*, C. R. Morgan. *Meetings*, Y.M.C.A., Pontypridd, Alternate Wednesdays, 7.30 p.m. *Sec.*, R. Llewellyn, Y.M.C.A., Pontypridd.
- Port Glasgow C.C.**—*Pres.*, Hugh Strathearn. *Meetings*, Club Rooms, West Quay, Tuesdays, 7.30 p.m. *Sec.*, Z. Fian, 81, Ardgowan Street, Port Glasgow.
- Portland.—Easton Red Triangle P.S.**—*Pres.*, C. Daw. *Meetings*, Y.M.C.A. Hut, Reforme, Portland, Mondays, 8 p.m. *Sec.*, G. T. Folland, 4, West Grove Terrace, Portland, Dorset.
- Portsmouth C.C.**—*Pres.*, Major E. C. Whittle. *Meetings*, 1, Middle Street, Southsea, Tuesdays, 8 p.m. *Sec.*, H. Coker, 4, Junction Road, Southsea.
- Post Office Savings Bank P.S.**—*Pres.*, Col. T. M. Banks. *Meetings*, Post Office Savings Bank, West Kensington, Alternate Wednesdays, October to March, 4.30 p.m. *Sec.*, P. C. R. Noble, Post Office Savings Bank, Blythe Road, W.14.
- Preston C.C.**—*Pres.*, James Nelson. *Meetings*, Stanley Chambers, Lancaster Road, Mondays, 8 p.m. *Sec.*, H. Booth, 9, Lindale Road, Fulwood, Preston.
- Preston Scientific Society (Photographic Section).**—*Chairman*, George Miller. *Meetings*, Lecture Hall, Ellesmere Chambers, Church Street, Tuesdays, 8 p.m. *Sec.*, E. Eastham, 130B, Church Street, Preston.
- Quarry Bank Amateur P.S.**—*Pres.*, C. D. Mathias. *Meetings*, Club Rooms, Victoria Road, Thursdays, 7.30 p.m. *Sec.*, L. F. P. Trueman, 5, High Street, Quarry Bank, Staffs.
- Reading Y.M.C.A. P.S.**—*Pres.*, Marcus Adams. *Meetings*, Y.M.C.A., Tuesdays, 8.0 p.m. *Sec.*, F. J. Morgan, Y.M.C.A., Reading.
- Richmond C.C.**—*Pres.*, G. H. Rodman, M.D. *Meetings*, The Cottage Public Library, Thursdays, 8 p.m. October to April. *Sec.*, F. H. Howard, M.A., 15, Dungarvan Avenue, Putney, S.W.15.
- Rochdale P.S.**—*Pres.*, J. S. Fielding. *Meetings*, Reform Club Buildings, Wednesdays, 8 p.m. *Sec.*, J. W. Seeley, The Gables, Thornham, Rochdale.
- Rodley and District P.S.**—*Pres.*, Dr. Bateman. *Meetings*, Society's Rooms, Town Street, Rodley, Thursdays, 7.30 p.m. *Sec.*, Wilson B. Lord, 161, North View, Rodley, Leeds.
- Rotherham P.S.**—*Pres.*, Wm. Firth. *Meetings*, Crofts Auction Mart, Moorgate

- Street, First and Third Tuesdays, September to April; First Tuesdays, other months, 7.45 p.m. *Sec.*, A. E. Camp, Rinodar, Munsbro' Lane, Greasbro' near Rotherham.
- Royal London P.S.—Pres.**, Chas. Humfrey. *Meetings*, Royal London House, Finsbury Square, E.C.2. *Sec.*, S. E. Norden, Valuation Department, Royal London House, Finsbury Square, E.C.2.
- Rugby Percival Guildhouse Photographic Group.—Meetings**, First Mondays, 7.30 p.m. *Sec.*, W. Turlton, 13, Oliver Street, Rugby.
- Rutherglen Amateur C.C.—Pres.**, R. Guy. *Meetings*, Club Room, Glasgow Road, Thursdays, 8 p.m. *Sec.*, A. Bird, 9, Hillfoot Avenue, Rutherglen.
- Rutherglen.—Phoenix Welfare C.C.—Pres.**, Andrew Milligan. *Meetings*, Phoenix Welfare Rooms, Dalmarnock Road, Rutherglen, Alternate Wednesdays, 7 p.m. *Sec.*, Wm. Dickson, 540, Gallowgate, Glasgow.
- St. Bride P.S.—Pres.**, G. M. Maynard. *Meetings*, St. Bride Foundation Institute, Bride Lane, E.C.4. Tuesdays, 7 p.m. *Sec.*, Mrs. F. A. Jordan, 29, Higham Road, Tottenham, N.17.
- St. Helen's C.C.—Pres.**, J. Hesford. *Meetings*, Y.M.C.A., North Road, Alternate Mondays, 7.30 p.m., from September 28th. *Sec.*, Geo. A. Forman, 206, Hard Lane, St. Helens.
- St. Martin's-le-Grand P.S.—Pres.**, Sir Henry Bunbury, K.C.B. *Sec.*, Miss Hicks, Ledge Branch, A.G.D., G.P.O., E.C.1.
- St. Rollox Co-operative C.C.—Pres.**, C. McKee. *Meetings*, 145, Glebe Street, Glasgow, Fridays, 8 p.m. *Sec.*, Richard I. Blitz, 171, Stanmore Road, Glasgow, S.2.
- Scottish Co-operative Photographic Association.—Pres.**, Jas. McCaffrey. *Meetings*, Affiliated Clubs' Hall, First Tuesdays, 8 p.m. *Sec.*, Donald Carmichael, 119, Montrose Street, Glasgow, C.4.
- Scottish Photographic Circle.—Pres.**, Robt. Wallace. *Meetings*, Institute Rooms, 200, Buchanan Street, Glasgow, First Wednesdays, 7.30 p.m. *Sec.*, W. S. Crockett, 47, Braidfauld Gardens, Glasgow, E.2.
- Scunthorpe P.S.—Pres.**, William Bamforth. *Meetings*, Centenary Church School, Tuesdays, 7 p.m. *Sec.*, Arthur Wrigley, 11, Jackson Road, Scunthorpe.
- Selby Scientific Society (Photographic Section).—Meetings**, Museum Hall, Irregular. *Sec.*, F. H. Harland, 2, Reginald Terrace, Selby.
- Sheffield P.S.—Pres.**, W. Shekelton. *Meetings*, 246, West Street, Tuesdays, from October to April, 7.30 p.m. *Sec.*, Miss N. I. Widdison, 35, Camping Lane, Woodseats, Sheffield.
- Sheffield and Hallamshire P.S.—Pres.**, J. H. Marshall. *Meetings*, Metallurgical Club 198, West Street, Second and Fourth Mondays, 7.30 p.m. *Sec.*, W. Beaulah, 46, Uppertorpe, Sheffield.
- Shettleston Co-operative Amateur C.C.—Pres.**, R. F. Robertson. *Meetings*, Mondays, 8 p.m., from March. *Sec.*, W. B. Whyte, 631, Shettleston Road, Glasgow, E.2.
- Small Heath P.S.—Pres.**, W. Davies. *Meetings*, St. Benedict's Church Club Room, Tuesdays, 8 p.m. *Sec.*, Ll. Evans, 207, Colonial Road, Bordesley Green, Birmingham.
- Smethwick P.S.—Pres.**, D. Junor. *Meetings*, Empire House, High Street, Wednesdays, 8 p.m. *Sec.*, J. W. Bloxham, 24, Broadmoor Avenue, Langley, near Birmingham.
- Southampton C.C.—Pres.**, W. Burrough Hill. *Meetings*, 30, Carlton Crescent, Mondays, 8 p.m. *Sec.*, F. P. Peck, Ranikhet, Warren Crescent, Southampton.
- South-East Essex Photographers, Fellowship of. Sec.**, H. W. Wood, Denford, High Road, Hutton, Essex.
- Southend-on-Sea and District P.S.—Pres.**, The Mayor. *Meetings*, Boys' High School, Victoria Circus, Fridays, 7.30 p.m. *Sec.*, G. A. Vince, "Langford," West Road, Shoeburyness.
- South Essex C.C.—Pres.**, Thos. H. B. Scott. *Meetings*, Manor Park Library, Romford Road, Wednesdays, 8 p.m. *Sec.*, Robert H. Bullen, 170, Browning Road, Manor Park, London, E.12.
- South London P.S.—Pres.**, H. Pickwell. *Meetings*, Central Library, Peckham Road, Mondays, 8 p.m. *Sec.*, R. J. Smith, 29, Talfourd Place, S.E.15.
- Southport P.S.—Pres.**, C. W. Connard. *Meetings*, St. John Hall, Scarisbrick Street, Mondays, 8 p.m., October to March. *Sec.*, P. S. Wilkinson, 13, Coudray Road, Southport.
- South Shields P.S.—Pres.**, Dr. J. Macdonald. *Meetings*, 16, King Street, Tuesdays, 7.30 p.m. *Sec.*, H. Burgess, 59, Hawthorne Avenue, South Shields.
- South Suburban and Catford P.S.—Pres.**, G. H. Dannatt. *Meetings*, Plough Hall, High Street, Lewisham, Wednesdays, 8 p.m. *Sec.*, H. J. Hewitt, 36, Sidewood Road, Eltham, S.E.9.
- Spenn Valley P.S.—Pres.**, J. Kaye. *Meetings*, Healds Hall, Leeds Road, Liversedge, First and Third Mondays, 7.30 p.m. *Sec.*, A. Pickering, 41, Thornes Road, Wakefield.
- Spenn Valley Literary Society, (Photographic Section).—Pres.**, J. Kaye. *Meetings*, Healds Hall, Liversedge. First and Third Mondays, 7.30 p.m. *Sec.*, J. Shoemith, Dalegarth, Highfield Drive, Birstall, Leeds.

- Stafford P.S.**—*Pres.*, B. Sinkinson. *Meetings*, Friends' Mission Hall, Foregate, Tuesdays, 7.30 p.m. *Sec.*, S. D. Barnwell, Y.M.C.A., Wolverhampton Road, Stafford.
- Staines P.C.**—*Pres.*, Dr. W. Dale. *Meetings*, Pack Horse Hotel, Mondays' 8.30 p.m. *Sec.*, K. W. Richardson, 165, High Street, Staines.
- Stockport P.S.**—*Pres.*, C. A. Barnes. *Meetings*, Oddfellows' Institute, Chester-gate, Second and Fourth Wednesdays, 7.30 p.m. *Sec.*, S. W. Linney, 23, Madras Road, Edgeley, Stockport.
- Stratford**—*G. E. R. P.S.*—*Meetings*, Mechanics' Institution, Store Street, Wednesdays, 8 p.m. *Sec.*, A. G. Barker, 24, Willow Street, Romford, Essex.
- Streatham and District P.S.**—*Meetings*, Bath Hall, High Road, Streatham, Alternate Thursdays, 8 p.m. *Sec.*, H. C. Wilkinson, 29, Pendle Road, Streatham Park, S.W. 16.
- Sunderland Photographic Association.**—*Pres.*, Wm. Milburn. *Meetings*, Subscription Library, Fawcett Street, Thursdays, 7.30 p.m. *Sec.*, J. R. Munro, 10, Park Place East, Sunderland.
- Swansea.**—*Mond Nickel Works P.S.*—*Meetings*, Mond Recreation Club, Alternate Tuesdays. *Sec.*, T. Horrocks, c/o Mond Nickel Co., Ltd., Clydach, Swansea.
- Swindon and North Wilts Field and C.C.**—*Pres.*, Canon E. H. Goddard, M.A. *Meetings*, The College, Swindon, First and Third Tuesdays, 7.30 p.m., from October. *Sec.*, C. Pendleton, Lyndene, 139, Kingshill Road, Swindon, Wilts.
- Times C.C.**—*Pres.*, T. S. Sheldrake. *Meetings*, "Times" Office, Printing House Square, E.C. First Mondays. *Sec.*, F. Read, Myrtle House, Barkham Road, Wokingham, Berks.
- Todmorden P.S.**—*Pres.*, Rev. Arthur W. Fox, M.A. *Meetings*, Vale Academy, Wellington Road, Tuesdays, and Thursdays, 8 p.m. *Sec.*, E. Heard, 7, Fir Street, Walsden.
- Torbay Camera Society.**—*Pres.*, A. B. Fellowes-Pryne. *Sec.*, Stuart Black, B.A., 1, Cary Place, Torquay.
- Tredegar P.S.**—*Pres.*, Rt. Hon. Lord Tredegar. *Meetings*, Y.M.C.A. Rooms, Alternate Tuesdays, 7.30 p.m. *Sec.*, I. H. Hughes, 92, Ash Vale, Tredegar, Mon.
- Tunbridge Wells P.A.**—*Pres.*, E. R. Ashton. *Meetings*, Christ Church Parish Room, First Mondays and Third Wednesdays, 8 p.m., October to April. *Sec.*, W. André Page, 31, Stephens Road, Tunbridge Wells.
- Twickenham P.S.**—*Pres.*, George A. Frith. *Meetings*, Twickenham Public Library, Last Thursdays, 8 p.m. *Sec.*, D. O. Frith, 116, Heath Road, Twickenham.
- Tynemouth (Borough of) P.S.**—*Pres.*, Burdus Redford. *Meetings*, 11, Northumberland Square, North Shields, Thursdays, 7.45 p.m. *Sec.*, A. S. McKenzie, 20, Grey Street, North Shields.
- United Stereoscopic Society.**—*Pres.*, A. T. Mole. *Meetings*, 39, Westbere Road, Cricklewood, N.W. 2, Second Sundays, from November to April, 6.30 p.m. *Sec.*, A. T. Mole, 39, Westbere Road, Cricklewood, London, N.W. 2.
- Wakefield P.S.**—*Pres.*, Basil Wade. *Meetings*, Technical College, Alternate Thursdays, 7.30 p.m. *Sec.*, G. E. Clayton, 43, Park Lodge Lane, Wakefield.
- Wallasey Amateur P.S.**—*Pres.*, F. H. Lancaster. *Meetings*, Y.M.C.A., Manor Road, Mondays, 8 p.m. *Sec.*, W. T. Chandler, 72, Serpentine Road, Wallasey, Cheshire.
- Walsall P.S.**—*Pres.*, F. Blanchard. *Meetings*, Institute Room, Co-operative Hall, alternate Mondays, 7.45 p.m. *Sec.*, Chas. G. Wheeley, 42, Camden Street, Walsall.
- Walthamstow and District P.S.**—*Pres.*, S. Bridgen. *Meetings*, Dane Court, Church Hill, Walthamstow Mondays, 8 p.m. *Sec.*, S. E. Johnson, Chine Lodge, St. Barnabas Road, Woodford Green.
- Wandgas C.C.**—*Pres.*, F. H. Jones. *Meetings*, "H. E. Jones" Memorial Institute, The Causeway, Wandsworth. *Sec.*, R. McCrae, 25, Huntsmoor Road, East Hill, London, S.W. 18.
- Warrington P.S.**—*Pres.*, H. Kitchen. *Meetings*, Old Academy, Bridge Street, Tuesdays, 7.45 p.m. from October to April. *Sec.*, J. H. Archer, 16, Fairfield Road, Stockton Heath, Warrington.
- Waterlow's (Dunstable) C.C.**—*Pres.*, V. E. Goodman. *Meetings*, Waterlow's Works, Dunstable, Alternate Wednesdays, 7.30 p.m. *Sec.*, M. K. Wakeling, 217, High Street, N., Dunstable.
- Watford C.C.**—*Pres.*, H. Ranson. *Meetings*, Public Library. Thursdays, 8 p.m. *Sec.*, F. C. Moss, "Meldreth," Wood Way, Oxhey, Watford.
- West Stanley C.C.**—*Pres.*, R. Simpson. *Sec.*, J. Law, 10, Wylam Terrace, Stanley, S.O., Co., Durham.
- Whitehall C.C.**—*Pres.*, Sir Francis L. C. Floud, K.C.B. *Meetings*, 6, Richmond Terrace, Whitehall, Alternate Tuesdays, 5.45 p.m. *Sec.*, F. M. Chapman, Ministry of Labour, Whitehall, London, S.W. 1.
- Whitley Bay and District C.C.**—*Pres.*, W. Rutherford. *Meetings*, St. John's Church Hall, Whitley Bay, Alternate Tuesdays, 8 p.m. *Sec.*, E. Gandy, 15, Holly Avenue, Whitley Bay.

Wimbledon C.C.—*Pres.*, H. J. Cornish. *Meetings*, Central School, Southey Road, Wimbledon, Thursdays, 7.45 p.m., October to April. *Sec.*, E. O. Cole, 10, Boscombe Road, Merton S.W. 19.

Winchester P.S.—*Pres.*, F. B. H. Wride. *Meetings*, Gudgeon and Sons, Southgate Street, First and Third Tuesdays. *Sec.*, F. E. Rawling, 60, High Street, Winchester.

Winchester College P.S.—*Pres.*, Rev. A. T. P. Williams, D.D. *Sec.*, S. R. Humby, M.A., The College, Winchester.

Windsor, Slough and District P.S.—*Pres.*, Rev. H. Tower. *Meetings*, Royal Albert Institute, Windsor, alternate Mondays, 8 p.m. *Sec.*, R. R. Stowell, 16, Alma Road, Windsor.

Wishaw Y.M.C.A. C.C.—*Pres.*, J. Marshall. *Meetings*, Y.M.C.A., Main Street, First and Third Tuesdays, 7.30 p.m., from November 22. *Sec.*, W. Gray, Lochside, Kirk Road.

Wolverhampton P.S.—*Pres.*, Lt.-Col. H. E. Twentyman. *Meetings*, Black and White Chambers, Darlington Street, Twice Monthly, 8 p.m. *Sec.*, J. W. Braithwaite, 10, Castle Street.

Wolverhampton—Chillington C.C.—*Pres.*, W. H. Cook. *Meetings*, Chillington Tool Works, Alternate Weeks, from October 30th to February 24th. *Sec.*, W. H. Cook. Chillington Tool Works, Wolverhampton.

Wolverton P.S.—*Pres.*, E. G. Milner, B.Sc. *Meetings*, Technical College, Alternate Mondays, 7.30 p.m. *Sec.*, A. H. Oldham, 10, Clarence Road, Stoney Stratford, Bucks.

Woodford P.S.—*Pres.*, F. G. Newmarch. *Meetings*, Monthly, 8 p.m. *Sec.*, W. C. Cook, 22, Elmhurst Drive, Woodford, E. 18.

Woodford.—Bancroft's School Scientific Society.—*Pres.*, T. G. Wells, M.A. *Meetings*, Physics Laboratory, Fridays, 4.15 p.m. *Sec.*, Frederick W. Jordan, Bancroft's School, Woodford Wells, Essex.

Woolwich P.S.—*Pres.*, G. F. Meinertzhagen. *Meetings*, Old Town Hall, William Street, First, Third and Fifth Thursdays, October to April, 7.30 p.m. *Sec.*, T. D. Nunn, 221, Crumond Avenue, Welling, Kent.

Worcestershire C.C. and Photographic Survey Society.—*Meetings*, 1a, High Street, Worcester Wednesdays, 8 p.m. *Sec.*, N. F. Pennington, Norferton, Cornmeadow Lane, Worcester.

Working Men's College C.C.—*Pres.*, G. Dixey. *Meetings*, Working Men's College, Crowndale Road, N.W. 1, Wednesdays, 8 p.m. *Sec.*, J. H. Ellis, Whiteaway, Syke Ings, Iver, Bucks.

Yarmouth Y.M.C.A. P.S.—*Pres.*, A. E. Lark. *Meetings*, Y.M.C.A., Fridays, 8 p.m. *Sec.*, W. J. Greaves, 24, South Quay, Great Yarmouth.

York and District P.S.—*Pres.*, A. C. Horner. *Meetings*, 3, Pavement, York, Thursdays, 8 p.m. *Sec.*, N. James Rushton, Tall Timbers, Hull Road, York.

York Railway Institute C.C.—*Meetings*, Railway Institute, Queen Street, York, *Sec.*, E. Rodwell, Burnside, Hob Moor, Holgate, York.

Amateur Cinematograph Societies.

Ace Movies, London.—*Meetings*, 119, Mitcham Lane, S.W. 16, Thursdays, 8.30 p.m. *Manager*, H. R. Hughes, 13, Woodbourne Avenue, Streatham, S.W. 16.

Amateur Cine Players Club.—*Pres.*, A. L. Sinclair. *Meetings*, Central Buildings, St. Petersburg, Stockport, Wednesdays, 8 p.m. *Sec.*, H. W. Greenwood, Penrhos, Beaufort Road, Ashton-under-Lyne.

Apex Motion Pictures.—*Sec.*, Miss Louise Johnston, 50, Harrington Street, London, N.W. 1.

Banbury Amateur Cinematographers' Society.—*Meetings*, The Studio, South Bar. *Sec.*, H. Norman Blinkhorn, 5, South Bar, Banbury.

Beckenham and District Cine Society.—*Meetings*, St. George's Church House, High Street, Beckenham, alternate Wednesdays, 8.15 p.m. *Sec.*, John W. Mantle, 56, Croydon Road, Beckenham.

British Kinematograph Society.—*Pres.*, Dr. Simon Rowson. *Sec.*, P. Kimberley, 25, Denmark Street, London, W.C. 2.

Cameo Pictures.—*Sec.*, F. Atkinson, 37, Littleover Avenue, Hall Green, Birmingham.

Civil Service Cine Society.—*Chairman*, Sigurd Moir. *Meetings*, fortnightly. *Sec.*, Norman Reid, 369, Lonsdale Road, Barnes, London, S.W. 13.

Cyclops Amateur Film Society.—*Sec.*, J. O. Trilling, 3, Nutley Terrace, London, N.W. 3.

Devonla Amateur Cine Club.—*Pres.*, Edgar Mcgahey. *Meetings*, Hinton, Lake & Sons, High Street, Exeter, First Tuesdays, 7.30 p.m. *Sec.*, J. W. Lowe, 92, Sidwell Street, Exeter.

Dundee Cine Society.—*Pres.*, D. C. Thomson. *Meetings*, Y.M.C.A., 13th of each month, 7.30 p.m. *Sec.*, J. Clifford Todd, 5, Newington Terrace, Broughty Ferry, Angus.

Folkestone Movie Makers.—*Sec.*, B. Richardson Billings, Cupola House, Dover Road, Folkestone.

Grimsby Radio and Cinematograph Society.—*Pres.*, E. Hall Felton. *Meetings*, Studio, Wellowgate, Wednesdays and Sundays, 7 p.m. *Sec.*, W. Markham, 104, Torrington Street, Grimsby.

Hampshire and Isle of Wight Cine Club.—*Pres.*, Capt. Barnard. *Meetings*, Canford, First Saturdays, 7.30 p.m. *Sec.*, A. S. Downes, Canford, Lee-on-the-Solent, Hants.

Incorporated Institute of Amateur Cinematographers, Ltd.—*Pres.*, His Grace the Duke of Sutherland, P.C. *Sec.*, William E. Chadwick, 7, Red Lion Square, London, W.C. 1.

Leeds Amateur Cine Club.—*Pres.*, W. Greaves. *Meetings*, Club Studio, Tuesdays, 7.30 p.m. *Sec.*, R. S. Neill, Woodlands, Weetwood Avenue, Headingley, Leeds.

Leicester Amateur Cine Club.—*Pres.*, F. J. Smith. *Sec.*, R. T. Trasler, 85, Skipworth Street, Highfields, Leicester.

Liverpool Amateur Film Society.—*Pres.*, Denis Furlong. *Meetings*, The Studio, 132, Bold Street, Wednesdays, 8 p.m. (members under 18, Thursdays, 7.30 p.m.). *Sec.*, Geo. E. Fisher, 132, Bold Street, Liverpool.

Manchester Film Society.—*Sec.*, Peter A. Le Neve Foster, 1, Raynham Avenue, Didsbury, Manchester.

Mayross Motion Picture Productions.—*Pres.*, S. G. Finch. *Meetings*, Odd Fellow's Hall, 186, Hammersmith Road, W. 6, Fourth Thursdays, 8 p.m. *Sec.*, W. G. Wright, 44, Burr Road, Southfields, London, S.W. 18.

Newcastle Amateur Cinematographers' Association.—*Pres.*, W. M. Dierick. *Meetings*, Balbec Hall, Westgate Road, Alternate Thursdays, 7.30 p.m. *Sec.*, H. Wood, Balbec Hall, Westgate Road, Newcastle-on-Tyne.

Rhos Amateur Film Productions.—*Meetings*, Henry Mellor, Ltd., Penrhyn Avenue, Sundays. *Sec.*, George E. Mellor, Bradda, Allanson Road, Rhos-on-Sea, North Wales.

Rugby Amateur Film Society.—*Pres.*, D. T. Adams, B.A. *Meetings*, Percival Guildhouse, St. Matthew Street, Thursdays, 7.30 p.m. *Sec.*, D. Powell, 146, Murray Road, Rugby.

Seeall Film Society.—*Pres.*, C. W. Gordon. *Sec.*, J. Gordon, Bordersmead, Loughton, Essex.

Sheffield Amateur Film Club.—*Pres.*, Dr. J. Pringle. *Meetings*, 6, South Lane, Cumberland Street, alternate Wednesdays, 8 p.m. *Sec.*, A. D. Hobson, 65, Pingle Road, Millhouses, Sheffield.

Southend Amateur Film Society.—*Pres.*, Alexander Field. *Meetings*, 1-1A, Western Esplanade, Westcliff, alternate Fridays, 8 p.m. *Sec.*, W. L. Gadsdon, 64, Genesta Road, Westcliff-on-Sea.

Southgate Cine Club.—*Pres.*, L. Ball. *Meetings*, 4, Selborne Road, Fridays, 7.30 p.m. *Sec.*, S. F. Neill, 4, Selborne Road, Southgate, N. 14.

Sub-Standard Film Society.—*Manager*, B. Braun. *Meetings*, 27, The Ridgway, S.W. 19, bi-monthly, Fridays, 8.30 p.m. *Sec.*, B. Braun, The Ridgway, Wimbledon, London, S.W. 19.

Swan Motion Pictures.—*Meetings*, 25, Kew Gardens Road, Wednesdays, 8.30 p.m. *Sec.*, E. J. M. Jones, 25, Kew Gardens Road, Kew, Surrey.

Teddington Amateur Film Productions.—*Pres.*, Marcus C. Hunter. *Meetings*, Clarence Hotel, First Tuesdays, 7.45 p.m. *Sec.*, V. Insan, 36, Cambridge Road, Teddington.

Teesside Cine Club.—*Chairman*, H. Linton. *Meetings*, 190, Linthorpe Road, Middlesbrough, Thursdays, 7.30 p.m. *Sec.*, W. Shaw, 9, Caxton Street, Middlesbrough.

Warrington Film Society.—*Pres.*, Thomas S. Steel. *Meetings*, Mill Street Chambers, Market Place. *Sec.*, Edward Strel, Mill Street Chambers, Market Place, Warrington.

Whitehall Photo-Cine Group.—*Chairman*, J. F. Marshall. *Meetings*, 6, Richmond Terrace, S.W. 1, alternate Tuesdays, 5 p.m. *Sec.*, Harry Walden, Heatherbell, Copse Avenue, West Wickham, Kent.

Wimbledon Amateur Cine Club.—*Meetings*, Wimbledon Model Railway Club, 90, High Street Passage, Thursdays, 8 p.m. *Sec.*, H. C. Bealy, 34, Murray Road, Wimbledon, S.W. 19.

Wimbledon Amateur Cine Club (Grosvenor Productions).—*Meetings*, 18, Ridgway, alternate Fridays, 8 p.m. *Sec.*, H. C. Bealy, 34, Murray Road, Wimbledon, S.W. 19.

York Amateur Film Society.—*Pres.*, Henry Foster. *Meetings*, Nutbrown Chambers, Clifford Street, Mondays, 7.30 p.m. *Sec.*, William Holden, 3, Acomb Road, York.

Postal Clubs.

- Abney Postal Folios, The.**—*Sec.*, H. W. Nevill, 33, Kelross Road, Highbury, London, N. 5.
- Albion Postal P.S. (Advanced Workers only).**—*Sec.*, Edgar M. Firth, 27, Battenhall Road, Worcester.
- Amateur Postal C.C.**—*Sec.*, W. L. G. Bennett, Kemerton, Lustleigh, Devon.
- Amateur Postal C.C.**—(Lantern-Slide Section).—*Sec.*, W. L. G. Bennett, Kemerton, Lustleigh, Devon.
- Architectural Postal P.S. for Record, Survey, and Pictorial.**—*Sec.*, S. G. Hall, 93, Hall Road, Handsworth, Birmingham.
- Argosy Postal P.C.**—*Sec.*, Rev. C. F. Lowry Barnwell, Stramshall Vicarage, Uttoxeter, Staffs.
- Brockwell Postal Photographic Circle, The.**—*Sec.*, Charles J. Berridge, 125, Norbury Crescent, Norbury, London, S.W. 16.
- Cambrian Postal C.C.**—*Secs.*, B. L. Critchley, St. Hilda's, 50, Waverley Road, Redland, Bristol, and N. L. Gryspeerd, Pelham, Croham Road, South Croydon.
- Circle, The.**—*Sec.*, H. W. Honess-Lee, Lynchaford, East Lane, North Wembley, Middlesex.
- Civil Service Provincial Portfolios.**—*Secs.*, R. B. Ainsworth and W. A. Wood, Ministry of Labour, and H. Atkinson, Ministry of Agriculture, London, S.W. 1.
- Gloucestershire Postal P.S.**—*Sec.*, C. Wray, Palliser, The Sheben Looe, Cornwall.
- Lantern Slide Postal Club.**—*Sec.*, T. B. Howell, 7, Woodlands Road, Alexandra Park, Manchester.
- Lloyds Bank Postal P.S.**—*Sec.*, H. A. Murch, Lloyds Bank, Limited, 39, Threadneedle Street, London, E.C. 2.
- Nature P.S.**—*Sec.*, E. J. Bedford, 11, St. John's Terrace, Lewes, Sussex.
- Perseverance Postal C.C.**—*Sec.*, G. F. Ryman, 19, Englishcombe Lane, Bath.
- Photographic Circle.**—*Sec.*, George H. Brumpton, 10, Northfield Way, Retford, Notts.
- Photographic Miniature Postal Portfolio.**—*Sec.*, C. Rae Griffin, "Lohama," Austenway, Gerrards Cross.
- Portrait Folio P.C.**—*Sec.*, E. Mervyn Rees, Yatton, Havard Road, Llanvyn.
- Postal C.C.**—*Sec.*, John MacSymon, 4, Arno Road, Oxtou, Birkenhead.
- Postal P.C.**—*Sec.*, John T. Rigby, 21, Hereford Road, Southport, Lancs.
- Railway P.S.**—*Sec.*, M. W. Earley, "Glenmore," Brunswick Hill, Reading.
- Rover Postal C.C.**—*Sec.*, John M. Scott, 48, Eglantine Avenue, Belfast.
- Shropshire Postal C.C.**—*Sec.*, R. G. V. Dymock, Sion Cottage, Sion Hill, Bath.
- Silver Plaque Postal C.C.**—*Sec.*, Dr. Arthur Gadsden, Trevean, South Road, Bishop's Stortford, Herts.
- Somerset Postal P.S.**—*Sec.*, P. G. Read, 11b, Clifton Park, Bristol.
- Stereoscopic Society, The.**—*Sec.*, H. J. Mobbs, 1, Norbury Hill, London, S.W. 16.
- American Sec., C. W. Culmer, 610, Genesee Street, E. Flint, Michigan, U.S.A.**
- New Zealand Sec., J. D. Richardson, Auckland Savings Bank, 8, Ponsonby Road, Auckland, New Zealand.**
- Australian Sec., H. A. Tregellas, 273, Balacava Road, Caulfield, North Melbourne, S.E. 7, Australia.**
- Sunbeam Portfolio Club.**—*Sec.*, R. T. Gibbon, 107, Hadley Road, New Barnet, Herts.
- Talbot Album Club.**—*Sec.*, F. H. Langdon-Davies, 16, Mount Pleasant, Cambridge.
- United Stereoscopic Society.**—*Sec.*, A. T. Mole, 39, Westbere Road, Cricklewood, London, N.W. 2.
- Wesley Guild Pen & Camera Postal Club.**—*Sec.*, E. Sowden, 3, Oakdene Mount, Clayton, Bradford, Yorks.
- Wessex Postal C.C. (Advanced Workers only).**—*Sec.*, C. Wray Palliser, The Sheben, Looe, Cornwall.
- Zodiac C.C.**—*Sec.*, H. G. Allen, c/o Alfred Holt & Co., India Buildings, Liverpool.
- Zoological P.C.**—*Sec.*, R. Chislett, Larkspur, Broom Crescent, Rotherham.

Photographic Societies Overseas.

BRITISH DOMINIONS.

(Including Irish Free State.)

- Adelaide Camera Club.**—*Pres.*, A. Edmond Stevens. *Meetings*, Institute Building, North Terrace, Second Mondays, 8 p.m. *Sec.*, V. Sharp, Institute Building, North Terrace, Adelaide, South Australia.
- Adelaide P.S.**—*Pres.*, A. C. Stempel. *Meetings*, Society of Arts Rooms, Institute Building, North Terrace, Fourth Mondays, 8 p.m. *Sec.*, R. C.

- Edwardes, Institute Building, North Terrace, Adelaide, South Australia.
- Auckland Amateur Motion Picture Club.**—*Pres.*, E. D. Wilkinson. *Meetings*, Tornquist Studio, Coliseum Buildings, Queen Street, alternate Tuesdays, 7.30 p.m. *Sec.*, R. G. H. Manley, P.O. Box 772, Auckland, N.Z.
- Auckland (N.Z.) C.C.**—*Pres.*, Nello Porter. *Meetings*, Foresters' Hall, First Thursdays, 8 p.m. *Sec.*, D. F. Lyons, 10, Linwood Avenue, Mount Albert, Auckland, N.Z.

- Auckland (N.Z.) Stereoscopic Society.**—*Sec.*, J. D. Richardson, Auckland Savings Bank, 8, Ponsonby Road, Auckland, N.Z.
- Canadian Press Photographers' Association (Inc.).**—*Pres.*, Chas. G. Roos. *Sec.*, W. H. Bird, 2325, Eleventh Avenue Regina, Saskatchewan.
- Canadian Cinema Arts Society.**—*Pres.*, Frank E. O'Byrne. *Sec.*, W. H. Bird, 2325, Eleventh Avenue, Regina, Saskatchewan.
- Cape Town P.S.**—*Pres.*, A. v. R. van Oudtshoorn. *Meetings*, Railway Institute, Second Tuesdays and Fourth Wednesdays. *Sec.*, Richard Dekenah. P.O. Box 2431, Cape Town.
- Christchurch P.S.**—*Pres.*, G. H. Fraser. *Meetings*, Regent Buildings, Cathedral Square, Second Thursdays, 8 p.m. *Sec.*, G. R. Ramshaw, 9, Bracken Street, Avonside, Christchurch, N.Z.
- Cork Camera Club.**—*Pres.*, A. T. Henley. *Meetings*, Fortnightly, November to May. *Sec.*, Alec R. Day, 103, Patrick Street, Cork.
- Dunedin P.S.**—*Pres.*, P. Beck. *Meetings*, 3, Liverpool Street, South British Buildings, Second and Fourth Mondays, 8 p.m. *Sec.*, Miss L. E. Winton, Macandrew Bay, Dunedin, N.Z.
- Durban Amateur P.S.**—*Pres.*, B. M. Narbeth. *Meetings*, Technical College, Second and Fourth Fridays, 8 p.m. *Sec.*, J. R. Walker, Box 2293, Durban, Natal, S. Africa.
- Durban C.C.**—*Pres.*, Jocelyn Leigh-Hunt. *Meetings*, Club Arcade, Smith Street, First and Third Thursdays, 8 p.m. *Sec.*, Herbert Poole, P.O. Box 1594, Durban, South Africa.
- Gordon College Amateur P.A.**—*Pres.*, G. R. King. *Meetings*, Gordon Institute of Technology, Geelong, Wednesdays, 8 p.m. *Sec.*, J. L. Sharp, 37, Elizabeth Street, Geelong West, Victoria, Australia.
- Manawatu C.C.**—*Pres.*, J. B. Fleck. *Meetings*, Miss Low's Studio, Fitzherbert Avenue, Palmerston North, Second Tuesdays, 7.30 p.m. *Sec.*, A. F. Killner, 21, Ward Street, Palmerston North, N.Z.
- Melbourne C.C.**—*Pres.*, G. J. Dehn. *Meetings*, Orient Line Buildings, 354, Collins Street, Thursdays, 8 p.m. *Sec.*, W. Broadhead, Maysia Street, Canterbury, E. 7, Victoria, Australia.
- Northern Tasmanian C.C.**—*Pres.*, J. H. Russell. *Meetings*, Stock Exchange Buildings, 57, Cameron Street, Launceston, Third Wednesdays 8 p.m. *Sec.*, M. Graven, Ann Street, Launceston, Tasmania.
- Photographic Society of Ireland.**—*Pres.*, G. Prescott. *Meetings*, Commercial Buildings, Dame Street, Dublin, alternate Tuesdays, 8 p.m. *Sec.*, W. Riddell Martin, Roebuck Grove, Clonskea, Co., Dublin.
- P.S. of New South Wales (Inc.).**—*Pres.*, R. T. Vance. *Meetings*, 32, Castlereagh Street, Sydney, Tuesdays, 8 p.m. *Sec.*, A. F. Grant, Box 829, G.P.O., Sydney, New South Wales.
- Port Elizabeth Amateur P.S.**—*Pres.*, E. B. King. *Meetings*, Society's Rooms, Athenaeum Buildings, First Wednesday, 8 p.m. *Sec.*, N. J. Cole, c/o Tauber & Corssen (Pty.), Ltd., Parker's Buildings, Britannia Street, Port Elizabeth, South Africa.
- Professional Photographers' Association of New South Wales.**—*Pres.*, Glen Broughton. *Meetings*, 182, Pitt Street, Sydney, Third Mondays, 7.30 p.m. *Sec.*, J. P. Farr, 182, Pitt Street, Sydney.
- Queensland C.C.**—*Pres.*, H. A. Snape. *Meetings*, Griffiths House, Queen Street, Second Tuesdays, 8 p.m. *Sec.*, E. C. Smith, Hill End Terrace, Hill End, Brisbane, Queensland.
- Southern Tasmanian P.S. (Hobart).**—*Pres.*, A. E. Lodge. *Meetings*, Wellington Buildings, 34, Elizabeth Street, Hobart, Alternate Tuesdays, 8 p.m. *Sec.*, Geo. B. Davies, c/o Messrs. Simmons, Wolfhagen, Simmons & Walch, 86, Collins Street, Hobart, Tasmania.
- Sydney Camera Circle.**—*Pres.*, Harold Carneau. *Meetings*, Strand Arcade, Pitt Street, Last Mondays and Second Wednesdays, 8 p.m. *Sec.*, G. J. Morris, 53, George Street, N., Sydney, N.S.W.
- Toronto C.C.**—*Pres.*, Bruce Metcalfe. *Meetings*, Club Rooms, 2, Gould Street, Mondays, 8 p.m., October to May. *Sec.*, Thornton Johnston, 2, Gould Street, Toronto, Canada.
- Wanganui Collegiate School C.C.**—*Pres.*, W. B. Martin. *Meetings*, Collegiate School. *Sec.*, B. H. Irvine, Wanganui Collegiate School, Wanganui, N.Z.
- Wellington C.C. (Inc.).**—*Pres.*, P. N. Denton. *Meetings*, P. C. Watt's Buildings, 250, Wakefield Street, First and Third Wednesdays, 8 p.m. *Sec.*, Miss H. Johnson, 250, Wakefield Street, Wellington, N.Z.
- Western Australia C.C. (Inc.).**—*Pres.*, W. Owen. *Sec.*, Will Davies, St. George's House, St. George's Terrace, Perth, W.A.
- Whangarei P.S.**—*Sec.*, R. R. Roseman, Box 92, Whangarei, New Zealand.

OTHER COUNTRIES.

- Camera Club (The), New York.**—*Pres.*, Robert F. Jacobus. *Meetings*, First Thursdays. *Sec.*, Lawrence A. Monahan, 121, West Sixty-eight Street, New York City, U.S.A.

China P.S.—*Pres.*, T. T. Ling. *Meetings*, 56, Nanking Road, Shanghai, Fridays, 8 p.m. *Sec.*, Charles Ling, 56, Nanking Road, Shanghai, China.

Madrid P.S.—*Pres.*, Conde de la Ventosa. *Meetings*, 16, Calle del Principe, Fridays. *Sec.*, F. Andraza, 16, Calle del Principe, Madrid.

Yucatan Association of Photographers.—*Sec.*, Lorenzo Valle Torres, Calle 53, No. 391 Mérida, Yucatán, Mexico.

Société Française de Photographie.—*Pres.*, M. le Général Perrier. *Meetings* are held at the Society's house, 51, Rue de Clichy, Paris. A general meeting is held on the Fourth Friday of each month at 8.30 p.m. Sectional meetings are held at 9 p.m. The scientific section meets on the First Tuesday, the cinematograph section on the Second Tuesday, the amateur cine section, Fourth Thursdays, the photo-mechanical section on the Third Tuesday, and the colour photography

section on the Fourth Tuesday. A Laussedat metrophotography section also holds meetings. Lantern evenings and instructional lectures are also held at various dates. The Acting Secretary, M. E. Cousin, conducts a course of twenty lessons on Monday evenings, at 9 p.m., beginning in January. In conjunction with this course, meetings for practical work are held every Saturday from 2-5 p.m. The Society publishes its monthly, the "Bulletin de la Société Française de Photographie." *Hon. Sec.*, A. Hachette. *Acting Sec.*, E. Cousin, 51, Rue de Clichy, Paris. Members of English photographic societies who may be passing through Paris can obtain cards of invitation to the meetings of the Society and of permission to make use of the Society's dark rooms for the changing or development of plates. The International Salon of Photography is held during the first fortnight of October each year.

Federations of Photographic Societies.

THE PHOTOGRAPHIC ALLIANCE.

The Royal Photographic Society of Great Britain, The Northern Counties and The Midland Counties Photographic Federations, the Yorkshire and The Lancashire and Cheshire Photographic Unions, The East Anglian Federation of Photographic Societies, The Central Association of Photographic Societies.

President.—Colin J. Unsworth. *Vice-President.*—W. B. Shaw. *Hon. Treasurer.*—Alex. Keighley, The High Hall, Steeton, Keighley, Yorks. *Hon. Secretary.*—J. S. Lancaster, 144, Middleton Hall Road, King's Norton, Birmingham. *General Secretary.*—H. H. Blacklock, 35, Russell Square, London, W.C. 1.

Groups of not less than six photographic societies in an area not already included in the area covered by an existing allied association may apply for admission. Applications and enquiries should be addressed to the Hon. Secretary.

The Alliance publishes a Year Book containing information about the allied associations and the societies therein, and societies are entitled to receive copies sufficient for distribution to all their members.

Among the advantages to societies, there are:—

The services of lecturers in their own and in other associations, and similarly the services of judges.

Loan of illustrated lectures, lantern slides, portfolios, etc. One copy of each issue (monthly) of THE PHOTOGRAPHIC JOURNAL—the official organ

of the Royal Photographic Society and of the Alliance.

Participation in the annual competitions of the Alliance. Temporary use, by members, of accommodation provided by other societies to members away from their own localities. Free admission on one evening to the annual exhibition of the Royal Photographic Society on production of Alliance voucher, and admission at half-price to other exhibitions of the R.P.S.

Admission of members to membership of the Royal Photographic Society without payment of entrance fee.

All associations admitted to the Alliance are entitled to use the sub-title "In alliance with the Royal Photographic Society of Great Britain," and every society belonging to an allied association is entitled to use the sub-title "Affiliated to the Royal Photographic Society of Great Britain."

Meetings of the Alliance Executive Committee, the members of which are the delegates of the various associations, are held at intervals throughout the year, at places to suit the convenience of all members.

The Annual General Meeting (of allied associations' officers) is held towards the end of March.

CENTRAL ASSOCIATION OF PHOTOGRAPHIC SOCIETIES AFFILIATED TO THE ROYAL PHOTOGRAPHIC SOCIETY.

Chairman.—G. H. Dannatt. *Vice-Chairman.*—H. Pickwell. *Hon. Secre-*

lary.—H. D. Fretwell. *Executive Committee*.—Harry Abbott, S. Bridgen, J. J. Butler, C. Chandless, G. E. W. Herbert, A. C. Jacobs, J. Dudley Johnston, R. H. Lawton, Charles H. Oakden, A. H. Redman, E. C. Ridge and Walter Selfe.

The Central Association of Photographic Societies exists as a federation of all those societies which were members of the old "Affiliation" and which do not lie in the geographical territory of one of the other federations which are incorporated in the "Photographic Alliance." It thus consists chiefly of societies in the South of England, in Scotland and overseas.

CIVIL SERVICE.

President.—W. L. Shand. *Secretary*.—F. M. Chapman, Ministry of Labour, 6, Richmond Terrace, Whitehall, London, S.W. 1. The Federation consists of 10 societies. There is also a Postal Club.

EAST ANGLIAN.

President.—T. Mathison. *Secretary and Treasurer*, P. G. Field, 79, Taverner's Road, Peterborough. The Federation consists of 18 Societies.

INTER-CLUB PHOTOGRAPHIC ALLIANCE.

President.—A. Kinder. *Secretary*.—Geo. R. Bradford, 77, Ruskin Avenue, Colne. *Secretary* (Print Section).—H. Hardaker, 17, Ridge Street, Todmorden. *Secretary* (Lantern Slide Section).—C. H. Taylor, 2, Lever Street, Todmorden.

LANCASHIRE AND CHESHIRE.

President.—Major H. Miller. *Secretary*.—R. A. Johnson, 9, St. James Street, Accrington. *Secretary* (Travelling Exhibition Prints).—T. Lee Syms, 69, Castle Street, Tyldesley. *Secretary* (Lantern Slide Section).—F. G. Curson, 35, Wellington Road, Eccles. *Secretary* (Print Portfolio Section).—H. Chapman, 35, Radstock Road, Stretford, Manchester. A Year Book is published, with a list of societies, lecturers and demonstrators, judges for

exhibitions, etc. The Union consists of 35 societies.

MIDLAND COUNTIES.

President.—F. W. Lawton. *Secretary*.—J. S. Lancaster, 144, Middleton Hall Road, King's Norton, Birmingham. *Secretary* (Portfolio and Lantern Slides).—F. Green, Monaco, Victoria Road, Coochs Green, Birmingham. The Federation promotes the Midland Salon of Photography and consists of 40 societies.

NORTHERN COUNTIES.

President.—Robert Chalmers, F.I.C., *Secretary*.—T. Ambler, 18, Raby Gardens, Bishop Auckland. *Secretary* (Competitions).—A. Leonard Hitchin, 55, Church Road, Gosforth. The Federation consists of 9 societies.

SCOTTISH.

President.—R. E. Forrester, Dunfermline. *Secretary*.—John Macdonald, 27, Aberfeldy Street, Dennistoun, Glasgow, E. 1. *Secretary*.—(Portfolio) Robert Robb, 30, Cambridge Avenue, Leith. *Secretary* (Lantern Slide).—Miss H. M. Bailey, 63, Watson Street, Aberdeen. The Federation promotes the Scottish Photographic Salon and consists of 51 societies.

(Glasgow District Union.)

President.—C. McKee. *Secretary*.—R. Marshall, 69, Edington Street, Glasgow. *Secretary* (Portfolio).—James Maclean, 6, Midton Street, Springburn. *Secretary* (Lantern Slide).—Robert Park, 23, Almond Street, Riddrie. The union consists of 20 societies.

YORKSHIRE UNION.

President.—Alex. Keighley. *Business Secretary*.—H. Storey, 119, Moorside, Armley, Leeds. *Secretary* (Challenge Trophy and Shield Section).—J. T. Blackshaw, Moorside, Hampton Road, Doncaster. The Union consists of 29 societies.

Survey and Record Societies.

BRISTOL.

President.—J. Cooke. *Secretary*.—Modaunt Miller, 7, All Saints Road, Clifton, Bristol.

EXETER.

President.—The Mayor. *Secretaries*.—F. R. Rowley and H. Tapley-Soper. Number of prints (housed at the City Library), 2000.

KENT.

Secretary.—H. E. Turner, B.A., B.Sc., 3, Carlton Road, Tunbridge Wells. Number of prints (housed at the Museum, Maidstone) about 2,000.

LYNN AND NORFOLK.

Secretary.—C. H. Senior, Stanley Public Library, King's Lynn. Number of prints (housed at the Stanley Public Library, King's Lynn), 950.

NORFOLK AND NORWICH.

Secretary and Curator.—Geo. A. Stephen, F.L.A., City Librarian, Central Public Library, Norwich. Number of prints (housed at Central Public Library, Norwich), 5,570. Also 2,740 lantern slides. A leaflet giving full particulars of scheme and of subjects included may be obtained from the Secretary.

SURREY.

President.—Lord Ashcombe, Lord Lieutenant of Surrey. *Hon. Secretary.*—D. S. Rose, 9, Wharfedale Gardens, Thornton Heath. Number of prints (housed at Public Reference Library, Croydon) 9,000. Also 1,700 lantern slides.

SUSSEX.

Hon. Secretary.—F. Harrison, M.A., 44, Market Street, Brighton. *Hon. Curator.*

—Henry D. Roberts, M.B.E., The Public Library, Brighton. *Hon. Treasurer.*—J. S. North, 44, Market Street, Brighton. Number of prints (housed at Public Library, Brighton), 3,000. Also 500 lantern slides and over 1,500 negatives.

WORCESTERSHIRE.

Secretary.—Miss M. Wight, Mordiford, Hereford. Number of prints (housed at Victoria Institute, Worcester), 780.

Photographic Bodies.

Under the above headings are arranged particulars of the chief photographic associations which cannot be appropriately included in the list of photographic societies.

PROFESSIONAL PHOTOGRAPHERS' ASSOCIATION.

President.—R. N. Hawkins (Brighton). *Past President.*—H. Bedford Lemere (London). *Chairman of Council.*—Angus Basil (London). *Treasurer.*—Valentine Bibbs (London). *Members of Council.*—London: Marcus Adams, W. J. Baker, A. Barratt, Miss Bee Belton, C. K. Bowers, Dudley Glanfield, A. G. Handford, D. H. Hooper, R. Lang Sims, N. D. Larkin, E. H. Parker, G. Marshall Smith. Country: E. J. Care (Eccles), A. H. L. Chapman (Swansea), Miss E. M. Eadon (Sheffield), P. Pelham Crowe (Reading), Miss Margaret Ellsmoor (Worthing), W. Fisk-Moore (Canterbury), G. N. Fletcher (Southsea), R. N. Haile (Bognor), P. Sweatman-Hedgeland, (Maidstone), H. M. King (Croydon), C. A. Peach (Exeter), E. J. Short (Nottingham), W. Nicol Smith (Glasgow), H. D. Halksworth Wheeler (Folkestone).

Secretary.—A. F. Bucknell, 357, Euston Road, London, N.W. 1.

Birmingham Centre.

President.—H. S. Eades. *Committee.* G. A. Barratt (Birmingham), P. Bott (Birmingham), J. N. Cockin (Old Hill), G. Elliott (Birmingham), W. J. Richardson (Walsall), J. S. Speight (Sutton Coldfield), G. H. Greenfield (Smethwick), A. Wells (Birmingham), H. J. Whitlock (Birmingham).

Secretary.—E. J. Edwards, 2, Holloway Head, Birmingham.

Bristol and District Centre.

President.—E. Basevi. *Committee.*—Miss Knight-Adkin, Miss Wills, A. G. Wager, J. Bromhead, J. A. Hamilton (Bristol), C. J. Howe, E. Knight, A. G. Bolwell (Bath), W. Bellamy, J. T. Worth (Weston-super-Mare). *Secretary.* Miss G. N. Knight-Adkin, 79, Park Street, Bristol. *Treasurer.*—Mrs. D. E. Turi, 81, White-ladies Road, Clifton, Bristol.

Devon and Cornwall Centre.

President.—J. Herbert Wilson. *Vice-President.*—E. E. Hindley. *Committee.*—Messrs. E. G. Castle (Exmouth), A. W. Ellis (Sidmouth), S. A. Chandler (Exeter), F. E. Notcutt (Plymouth), Scott, Galloway (Torquay), Miss Margaret Edgar (Minehead), W. S. Rendell (Yeovil). *Secretary.*—C. A. Peach, 235, High Street, Exeter.

Kent County and District Centre.

President.—Miss D. Sherwood. *Committee.*—Halksworth Wheeler, W. Fisk-Moore, S. Harrison, C. S. Harris, S. P. Jenkins, B. Horner. *Secretary.*—E. V. Bowles, 3, Townwall Street, Dover.

London Centre (North of Thames).

President.—Marshall Smith. *Vice-President.*—Miss Bee Belton. *Hon. Treasurer.*—Martin Sander. *Committee.*—Miss Daisy Day, H. C. Messer, L. E. Muller, A. W. Musto, F. Sheffield, J. Games, H. Douglas. *Secretaries.*—A. Elsy and A. Hester, 343, Finchley Road, N.W. 3.

Lancashire and District Centre.

President.—Thomas Taylor. *Committee.*—W. T. Carter (Rochdale), Ernest Care (Eccles), Duke Dawson (Altrincham), George J. Leech (Denton), N. S. Kay (Manchester), Roderick Kay (Manchester), R. Podmore (Colne), F. W. Schmidt (Manchester), T. Lee Syms, F.R.P.S. (Tyldesley), Arthur Winter (Preston), Cecil Thomas (Hyde). *Secretary and Treasurer.*—R. Shaw, 34, Bolton New Road, Atherton, Lancs.

Luton and District Centre.

President.—Wm. Harold Cox. *Secretary.*—F. E. Holmes, Stuart Street, Luton, Beds.

Northumberland and Durham Centre.

President.—James Dickinson. *Vice-President.*—S. Gordon Hilton. *Committee.*—H. O. Thompson, S. A. Stuart, David

Blount, J. R. Edis, Gladstone Adams.
Hon. Secretary.—Charles Nicol, 44-46,
Grosvenor Road, Jesmond, Newcastle-on-
Tyne.

**NORTH YORKSHIRE AND SOUTH DURHAM
DISTRICT CENTRE.**

President.—C. W. Kipling. *Vice-
President.*—N. Bunting. *Secretary.*—
W. Haig Parry, 1, Oxford Road, Middles-
brough.

South Wales and Monmouthshire Centre.

President.—H. L. Chapman. *Vice-
President.*—H. Craely. *Committee.*—
Messrs. C. H. Farmer, A. O. Forrest, L.
Ladd, O. Long, and M. Norman. *Treasurer.*
—D. Fraser, Donald, Charlotte Square,
Ehivbina, Cardiff. *Secretary.*—Max
Craely, 3, The Hayes, Cardiff.

South Yorkshire and District Centre.

President.—David Holmes. *Vice-
President.*—C. R. H. Pickard. *Secretary.*—
Miss Ethel M. Eadon, 239, Glossop Road,
Sheffield.

Surrey and South London Centre.

President.—Douglas Hooper. *Vice-
President.*—H. Parker. *Committee.*—Miss
M. Shelley, Messrs. A. Handford, E. B.
Cook, J. Erith, F. Woods, L. S. Brooke,
E. Jenkins, G. P. King, W. T. Cook and
W. J. Baker. *Treasurer.*—H. M. King,
85, George Street, Croydon. *Secretary.*—
H. Parker, Aston Studio, East Street,
Epsom.

Sussex Centre.

President.—R. N. Haile (Bognor).
Committee.—E. W. Pannell (Hove), Miss
Payne (Eastbourne), A. H. White (Little-
hampton), J. Gill (Chichester), J. J. Hill
(Newhaven). *Treasurer.*—S. J. Nunn
(Brighton). *Secretary.*—Miss Ellsmoor,
Onslow House, Worthing.

**BELFAST AND NORTHERN IRELAND
PROFESSIONAL PHOTOGRAPHERS'
ASSOCIATION.**

President.—W. J. Moffett. *Vice-
President.*—Charles Haig. *Committee.*—
J. R. Bainbridge, Louis Morrison, Beula
Martin, Dorothy Horton. *Secretary.*—
Alex R. Hogg, 81, High Street, Belfast.

**EDINBURGH SOCIETY OF PROFESSIONAL
PHOTOGRAPHERS.**

President.—W. B. Hislop. *Hon. Secre-
tary and Treasurer.*—A. Allan-Lowson,
116, Hanover Street, Edinburgh. *Com-
mittee.*—George Balmaln, W. J. Hutchison,
and F. D. Young.

**GLASGOW AND WEST OF SCOTLAND
SOCIETY OF PROFESSIONAL
PHOTOGRAPHERS.**

President.—John Doig. *Vice-President.*
—George J. Hughes, F.R.P.S. *Secretary
and Treasurer.*—W. A. Callander. *Com-
mittee.*—S. G. Askham, J. R. Brinkley,
James Buchanan, S. C. Edmie, G. W.
Pilkington, John E. Polmont, Robert
Shankland, W. Nicol Smith.

**BRITISH PHOTOGRAPHIC MANUFACTURERS'
ASSOCIATION.**

President.—E. W. Houghton (Ensign,
Ltd.). *Vice-Presidents.*—J. Hill (Imperial
Dry-Plate Co., Ltd.). *Hon. Treasurer.*—
E. B. Cook (Johnson & Sons, Manufactur-
ing Chemists, Ltd.), *Hon. Secretary.*—F.
E. Greenwood (Elliott & Sons, Ltd.).

**BRITISH OPTICAL INSTRUMENT MANU-
FACTURERS' ASSOCIATION.**

President.—R. S. Whipple. *Vice-
Presidents.*—J. Hasselkus, W. E. Watson
Baker. *Hon. Treasurer.*—J. Stanley
Walker. *Hon. Secretary.*—T. J. Offer.
Council.—S. Borthwick, H. Hughes, R.
Miall, A. Simms, F. Twyman, F. Watts.
Secretary.—W. B. Stokes, 329, High
Holborn, London, W.C.1

**BRITISH SCIENTIFIC INSTRUMENT
RESEARCH ASSOCIATION.**

Chairman.—H. T. Tizard. *Vice-Chair-
men.*—Conrad Beck, C.B.E., E. B.
Vignoles. *Director of Research.*—Sir
Herbert Jackson, K.B.E., F.R.S., F.I.C.
Secretary.—J. W. Williamson, B.Sc., 26,
Russell Square, London.

PHOTOGRAPHIC DEALERS' ASSOCIATION.

President.—W. Hudson. *Vice-President.*
—W. Thompson. *Hon. Treasurer.*—C. T.
Thonger. *Hon. Secretary.*—Wallace
Heaton. *General Secretary.*—E. J. Andrews
4, Upper Bedford Place, Russell Square
London, W.C.1.

**WHOLESALE PHOTO FINISHERS'
ASSOCIATION.**

President.—C. E. Houghton. *Hon.
Treasurer.*—Will Barker. *Secretary.*—E. J.
Andrews, 4, Upper Bedford Place, Russell
Square, London, W.C.1.

**SHEFFIELD BRANCH PHOTOGRAPHIC
DEALERS' ASSOCIATION.**

President.—H. Mottershaw. *Secretary.*—
H. Mottershaw, Sheffield Photo Co., Ltd.,
Norfolk Row, Sheffield.

**PHOTOGRAPHIC CONVENTION OF THE
UNITED 'KINGDOM.**

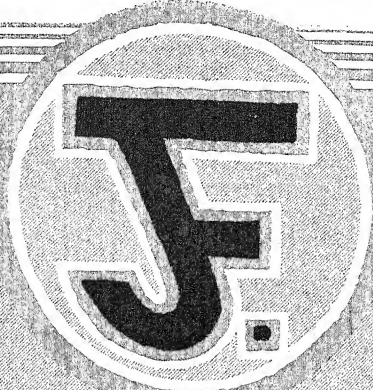
Trustees.—Dr. George Rodman, Sir Cecil
Hertslet, G. H. Hunter, Capt. F. C. T.
Hadley. *Hon. Secretary and Treasurer*
—Capt. F. C. T. Hadley, Houndsfield,
Holly Wood, near Birmingham.

LONDON SALON OF PHOTOGRAPHY.

Hon. Treasurer.—E. T. Holding. *Hon.
Secretary.*—F. J. Mortimer, 5A, Pall Mall
East, London, S.W.1.

THE PHYSICAL SOCIETY.

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D.Sc. *Treasurer.*—R. S. Whipple. *Secre-
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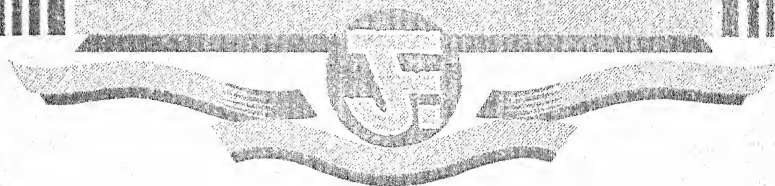
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Our premises, in their central position overlooking Charing Cross to Trafalgar Square, are at the commencement of the noble thoroughfare leading to the Houses of Parliament. "Trafalgar Square" and "Strand" Stations on the Tube Railway are only a few minutes away, and either of the Charing Cross Stations (Southern and Underground) are reached in five minutes. Numerous omnibuses from all parts pass the door.



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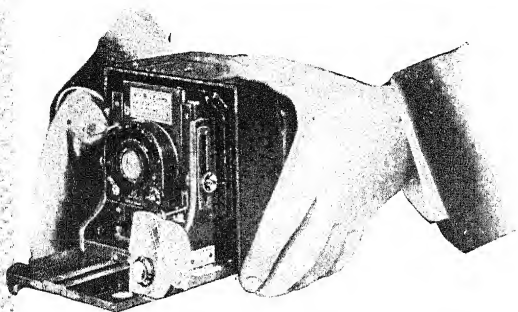
Our Service. The name of Sinclair is synonymous with quality, and we are always ready to help and advise our friends concerning apparatus and materials of our own or other manufacturers. All goods advertised in this Almanac may be purchased from us.

Clients Abroad. Our large export trade has been built up by careful attention to Foreign orders. We realise that any error takes a long time to rectify, and every care is taken in testing apparatus before shipment.

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The SINCLAIR "UNA"



Standard
Model
with "UNA"
Tilting
Finder
scaled to
agree with
the Rising
Front of the
Camera.

Striking comment of an officer of the MOUNT EVEREST EXPEDITION. He writes:

"During the Expedition I gave up using my own Camera, and used entirely one of your 'Una' Cameras we had with us, as I was so taken with the absence of unnecessary movements, and consequent rigidity of the instrument."

Some Press Comments

"Of the 'Una' Camera as an instrument of the best design and workmanship we have occasion to speak in the highest terms. Though it is equal to the widest range of work, it is an instrument of few movements and working parts."

The British Journal of Photography.

"Simplicity of design, combined with efficiency of movements and soundness of construction, are the leading points."—*Morning Post.*

Although it is a good many years since the Sinclair "Una" was placed upon the market it has never been surpassed for the excellence of its workmanship, and still holds its position as the best British Camera for Hand and Stand Photography.

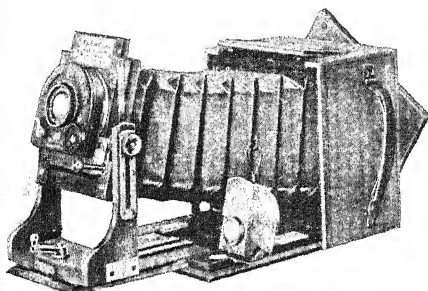
WHY THE "UNA" WINS WORLD-WIDE PRAISE

1. Because of its workmanship. Our aim is to make a thoroughly good instrument, perfect in every detail.
2. Because of its simplicity. We have introduced the movements required by the practical worker and omitted those that are rarely used and impair efficiency.
3. Because of its design. We have given the greatest consideration to the points usually overlooked in camera construction. The design of the rising front, swing front and revolving back is such as to ensure the maximum rigidity when they are in use.
4. Because of its capacity. The "Una" is capable of doing everything. It can be fitted with any lens, any form of shutter and any style of plate or film-changing mechanism.

LONDON

The Standard "UNA"

ITS APPEARANCE. The Standard "Una" when closed appears as a compact box, covered with fine hard-grain morocco leather. When the camera is opened and the front is extended, as in the illustration, the inner woodwork is seen to be of fine polished mahogany with brass fittings, all finished in the best possible style. The bellows is of leather, of long extension, and is particularly deep at the front to allow of a great range in rising front movement. It will be noticed that



The Standard "Una," showing front raised and tilted, and revolving back.

when the camera is held in the hand ready for use, the level, finder and focussing scale are all on the left-hand side and in close proximity to one another—a small point, but one of the utmost importance in actual work. Focussing is done by means of a rack and pinion focussing screw with cross rack to prevent back-lash, and this, together with the shutter release, is actuated by means of the right hand. The feature that particularly impresses anyone who has not had experience with the "Una" Camera is the extraordinary rigidity of the front, and it is this that has made the "Una" so popular amongst well-

known experts in tele-photography, such as Captain Owen Wheeler and the late Dr. Atkin Swan. It was selected by the Royal Geographical Society for the Mount Everest Expedition. With modern anastigmat lenses the importance of a rigid front is frequently overlooked. In the Sinclair "Una" we have not sacrificed efficiency for the sake of an ounce or two in the weight.

The Sinclair "Una," instead of a detachable reversing back, has a revolving back that may be instantaneously changed from the upright to the horizontal position, even after the shutter of the dark slide is drawn and the plate is ready for use. On the revolving back is a deep hood, which may be quickly removed from the ground glass by pressing a couple of springs, should the hood not be required for any particular work.

The Sinclair "Una" front is solidly made with a firm base which can be instantaneously clamped to the baseboard. We do not use any clips or springs to hold the front when the camera is brought out to the infinity mark, because in our opinion such spring clips, although perhaps very fairly effective when a camera is new, are likely to soon wear and they militate against the rigidity that is possible when the base of the front is tightly clamped to the base of the camera.

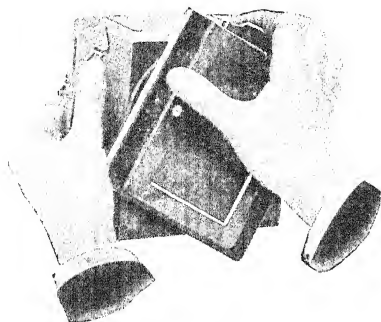
THE SINCLAIR RISING AND SWING FRONT. An important feature of the "Una" is the enormous range of Rising Front movement, and this rising front action is quite independent of the swing front. It will be found in practical work that the rising front is the first movement that the worker requires, particularly with modern anastigmat lenses. The extent of the rising front movement will be found on page 452. The Swing Front is an action more rarely required, and with the "Una" the swing front action is a central swing, and the importance of a central swing will be greatly appreciated by all expert photographers. It permits of the foreground being rendered perfectly sharp at the same time as the more distant objects when using a large aperture lens.

John Russell Pope, Esq., writing from New York, U.S.A., says:—"The 5×4 'Una' is equal to anything. I am delighted with it, for it is simple and fool-proof."

THE "UNA" EXTENDING BASEBOARD. The Standard "Una" has Double Extension, and this is sufficient to allow objects to be copied the same size with the lens usually fitted. A Triple Extension pattern is also made.

THE FOCUSING SCALES. These are of real ivory and divided into yards, not into an odd number of feet, which are exceedingly difficult to judge. In practice, yards correspond with strides, and will be found very easy to estimate.

A "DEPTH OF FOCUS SCALE," indicating the depth of focus obtained with various stops, is also fitted.



The Revolving Back of the Sinclair "Una."

THE SINCLAIR "UNA" REVOLVING BACK. This very important improvement permits the plate or film being changed from the vertical to the horizontal position without removing the back of the camera, which revolves on a light-tight turn-table.

THE "UNA" DOUBLE PLATE HOLDERS. The "Una" Plate Holders differ materially from other plate holders apparently similar in design, and we have no hesitation in stating that for all but colour work they are far superior to the best book-form slides. For colour plates we supply specially designed book-form slides fitted with improved light-tight valves and

draw-out shutters. The features of the "Una" Slide are:—

1. The quality of the pull out shutters, which are of the finest hard rubber. It is very rarely these shutters break, and they can be recommended for tropical use.
2. The valves in the plate holders where the shutters enter are made with the greatest care and ensure a more light-tight fitting than is possible with book-form slides.
3. Each plate holder is fitted with Auto-Safety Catches to obviate double exposure.

THE LEVELS. All cameras are fitted with Levels, the position selected being near the finder and focussing scale.

THE GROUND GLASS SCREEN is covered with a Focussing Hood, so arranged that it can be removed in a moment should a focussing cloth or focussing glass be preferred.

THE FINDER. An important part of the "Una" Outfit is the Sinclair Tilting Finder. With most hand cameras the finder is quite worthless when the rising front is in action, and without the rising front it is impossible satisfactorily to photograph subjects in which buildings appear. Our contention is that as good work should be done in the hand as can be done on a tripod, and this is only possible with such a finder as ours. When taking a picture the camera is held level as judged by the spirit level, the finder is then tilted to get the view desired, after which the scale on the rising front is adjusted to agree with the scale on the finder. The exposure is then made.

J. A. Smith, Esq., of the Sarawak Government Offices, writes:—"The best little camera I have ever had."

LENSES. The best camera needs the best lens, and the best lens is of little value without a perfect camera. The late war proved that the boasted superiority of some foreign lenses was an idle myth, and we use those British made lenses whose worth has been proved.

SHUTTERS. On the smaller size cameras we use the "N.S." Perfect Shutter (see page 458). The "N.S." Shutter has not the aggravating jump in speed which is such a feature of most diaphragmatic shutters, but is at present only made in small sizes. With other makes, as fitted to the larger lenses and cameras, we advise having the speeds tested at the National Physical Laboratory.

THE TROPICAL STANDARD "UNA"

THE TROPICAL STANDARD "UNA" is exactly the same design as the regular pattern, but it is made of selected mahogany, brass screwed or bound, and polished on the outside instead of being leather covered. We do not make our cameras in teak, because our experience is that teak is quite unsuited for hot and dry climates.

DETAILS OF STANDARD MODELS

	Size closed without hood.	Exten- sion.	Weight with screen but without hood.	Extent of rising front.	Thickness of hood.	Weight of hood.
$3\frac{1}{2} \times 2\frac{1}{2}$ in., or $9 \times 6\frac{1}{2}$ cm.	$4\frac{1}{2} \times 3\frac{1}{2} \times 5$	$9\frac{1}{2}$ in.	1 lb. 10 oz.	$1\frac{1}{2}$ in.	$\frac{1}{2}$ in.	$1\frac{1}{2}$ oz.
$4\frac{1}{2} \times 3\frac{1}{2}$ in.	$5\frac{1}{2} \times 3\frac{1}{2} \times 6$	$11\frac{1}{2}$ "	2 " 6 "	$2\frac{1}{2}$ "	$\frac{3}{4}$ "	$2\frac{1}{2}$ "
5×4 "	$6\frac{1}{2} \times 4\frac{1}{2} \times 6\frac{1}{2}$	$12\frac{1}{2}$ "	2 " 15 "	$2\frac{1}{2}$ "	$\frac{3}{4}$ "	3 "
$5\frac{1}{2} \times 3\frac{1}{2}$ "	$7 \times 4\frac{1}{2} \times 7\frac{1}{2}$	$13\frac{1}{2}$ "	3 " 12 "	3 "	$\frac{3}{4}$ "	3 "
10×15 cm.	$7\frac{1}{2} \times 4\frac{1}{2} \times 7\frac{1}{2}$	$13\frac{1}{2}$ "	4 " 2 "	3 "	$\frac{3}{4}$ "	$3\frac{1}{2}$ "
$6\frac{1}{2} \times 4\frac{1}{2}$ in.	$8 \times 4\frac{1}{2} \times 8\frac{1}{2}$	$15\frac{1}{2}$ "	4 " 8 "	$3\frac{1}{2}$ "	$\frac{1}{2}$ "	4 "
7×5 in. or 18×13 cm.	$8\frac{1}{2} \times 5 \times 9$	17 "	4 " 12 "	4 "	$\frac{1}{2}$ "	$4\frac{1}{2}$ "

The "UNA" for High-power Tele-photography

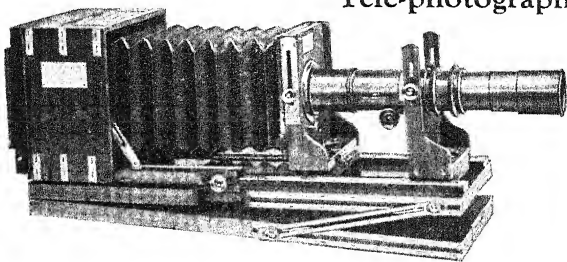


Illustration of Standard Tropical Model "Una" Camera, supplied to H.M. Government, complete with Atkin-Swan Tilting table and Telephoto Lens.

Otho Webb, Esq., of Queensland, Australia, writes:—"The Everest 'Una' is a beauty—it is so perfectly built. Everyone has fallen in love with it."

PRICES

STANDARD MODEL "UNA" CAMERA, with "Una" Tilting Finder scaled to agree with rising front on camera, Level, Focussing and Depth of Focus Scales. Three Double Plate Holders, "N.S." Perfect or other suitable diaphragmatic Shutter and fitted with lenses as follows:—

Lenses	$3\frac{1}{2} \times 2\frac{1}{2}$ and $9 \times 6\frac{1}{2}$ cm.	$\frac{1}{4}$ -plate	5×4 or 9×12 cm.	10×15 cm., or $5\frac{1}{2} \times 3\frac{1}{2}$	$\frac{1}{4}$ -plate	7×5 and 13×18 cm.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Ross Homo- centric F/6'8	21 10 0	23 0 0	26 10 0	27 0 0	32 10 0	36 10 0
Ross Xpres, F/4'5	23 10 0	26 10 0	29 0 0	32 0 0	36 10 0	41 10 0
*Ross Comb- inable, 2 foci, F/5.5 & F/11	28 0 0	31 10 0	34 10 0	37 10 0	42 0 0	46 10 0

* These prices include Cameras with Triple Extension.

TROPICAL MODELS. Extra on above prices.

£3 10 0 £3 10 0 £4 0 0 £4 0 0 £4 0 0 £4 0 0

Triple Extension on Standard and Tropical Models, £2 0 0 extra on all sizes

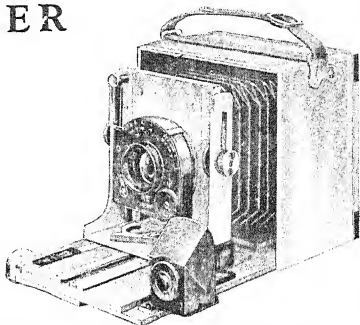
Accessories for "Una" Cameras

	$3\frac{1}{2} \times 2\frac{1}{2}$ and $\frac{1}{4}$ -plate.	5×4 and 9×12 cm.	10×15 cm. and $5\frac{1}{2} \times 3\frac{1}{2}$	$\frac{1}{4}$ -plate.	7×5 and 13×18 cm.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Extra Double Plate Holders each	1 2 6	1 8 0	1 11 6	1 17 6	2 2 0
Extra Tropical Spanish Ma- hogany Plate Holders, each	1 7 6	1 13 0	1 16 6	2 2 6	2 7 6
Special Book-form Plate Holders, suitable for Auto- chrome, Agfa, or ordinary Plates	2 2 0	2 7 6	2 10 0	2 15 0	3 0 0
Ditto, Tropical Model	2 7 0	2 12 6	2 15 0	3 0 0	3 5 6
Leather covered Film Pack Adapter	2 5 0	2 10 0	2 15 0	3 0 0	3 10 0
Ditto, Tropical Model	2 15 0	3 0 0	3 5 0	3 10 0	4 0 0
Hand-sewn Leather Case, with lock and key, to hold Camera and three Slides	3 5 0	3 15 0	4 0 0	4 15 0	5 5 0
Ditto, for Camera and six Slides	3 15 0	4 5 0	4 15 0	5 10 0	6 0 0
Web-sling Shoulder Strap for Camera Case	0 10 6	0 10 6	0 10 6	0 10 6	0 10 6
Graflex Roll Holder includ- ing fitting	4 15 0	5 5 0	5 5 0	—	6 2 6
Ditto, Tropical Model	6 6 0	6 16 0	6 16 0	—	7 15 0

Atkin-Swan Tilting Table, for use with high power Telephoto Lenses. Price for all sizes (illustrated on page 452) .. £7 10 0

The SINCLAIR "TRAVELLER UNA"

is a
Metal Camera of
the Highest Class.
 $3\frac{1}{2} \times 2\frac{1}{2}$ ($9 \times 6\frac{1}{2}$ cm.)
with
Ross Combinable
Lens (2 foci)
and "N.S."
Perfect Shutter



The "Traveller Una" with normal extension
as used with the combined lens.

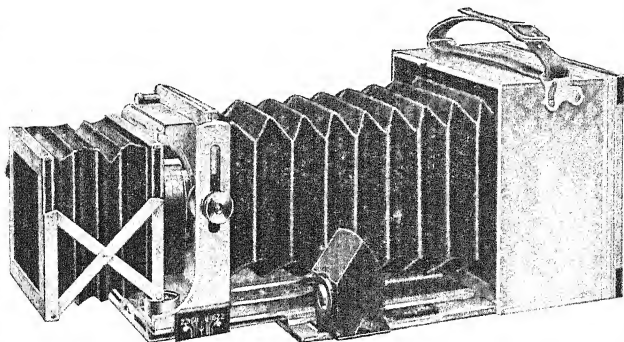
"A joy to look upon, and stands in a class by itself ready for work in any habitable (or practically uninhabitable) part of the globe."—*Photographic Journal*.

The "TRAVELLER UNA" is built on the same lines as our Standard and Tropical Models, and is particularly suited for Explorers and Scientists who require an instrument to stand the roughest wear and tear. It is made of Duralumin—a metal nearly as light as aluminium but without any of its drawbacks, and is very beautifully finished. It is as well adapted for hand as for stand use, and the lens fitted is perhaps the most generally useful lens made for the practical worker, because not only is it very rapid (F/5.5) but the single elements working at F/11 give a very practical telephoto effect when photographing distant objects such as mountains, etc.

In this camera we have not hesitated to add a little extra weight, so that perfect rigidity is secured when fully extended, either when copying objects the same size or if used for telephoto work. The camera is fitted with two scales, one for the combined lens working at F/5.5, and the other for the single lens working at F/11. It has a tilting finder marked down to show the view given by the combined and single lens. This finder is scaled to show the amount of foreground cut off when the rising front of the camera is in use, and a level is also fitted.

The SINCLAIR "TRAVELLER UNA"

(continued)



The "Traveller Una" with double extension and with Sinclair Lens Hood on front.

The shutter is the "N.S." PERFECT Shutter, giving the speeds required by the practical worker, viz. : from $\frac{1}{2}$ -second to 1/100th second, as well as "Time" exposures.

The "TRAVELLER UNA" with its shutter and optical equipment is only sold as a complete unit, and it cannot be supplied without lens or shutter, although other supplementary and Telephoto Lenses can be added to the outfit when desired.

The "TRAVELLER UNA" measures $4\frac{5}{8} \times 3\frac{1}{2} \times 4\frac{5}{8}$ in. ($11.7 \times 8 \times 11.7$ cm.). The extension is 10 in. (25 cm.), and the weight, including lens and shutter, is 3 lb. (1.36 kilos.).

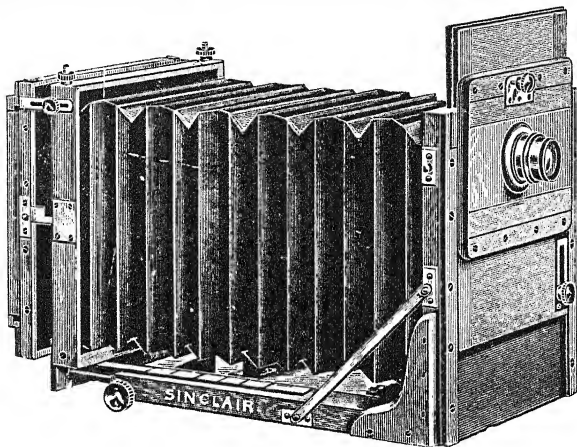
The Price of the Outfit complete, including Lens and Shutter as described, and three Tropical Model "UNA" Plate Holders £35

Extra for Sinclair Lens Hood as illustrated, 25/-

Film Pack Adapters and other Accessories can be fitted as listed on page 453.

The Sinclair "Technical" Camera

As supplied to The War Department, His Majesty's Indian Government; The New South Wales Government; The Crown Agents for the Colonies; Southern Rhodesia; The Siamese Government; The Egyptian Government; Engineering Works and Scientific Institutions.



This Camera in its general character is of the square bellows long-focus type but has a number of improvements in design, making it the most efficient of its class and particularly suitable for Professional, Technical and Scientific work. It is made of the best seasoned Spanish mahogany, and great care is taken to ensure parallelism between front and back, an important matter with modern anastigmat lenses.

THE RISING AND FALLING FRONT. As will be seen from the illustration there is a very great rising front movement, and there is an equally great falling movement. This is attained by means of a moving panel at the back of the rising front, and which may be adjusted so that either a great rise or a great fall is secured.

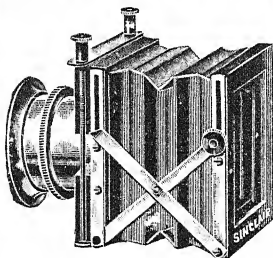
THE SWING BACK. A central swing is provided, and the arms are as long as possible, so that the greatest range of movement may be obtained. By means of the clamping screws on the top of the camera a side swing can also be obtained for special work.

	$6\frac{1}{2} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	12×10	15×12
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Camera and 3 Double Dark Slides	24 0 0	30 0 0	40 0 0	50 0 0
Ditto, Brass Bound ..	27 10 0	34 0 0	45 10 0	56 10 0
Extra Double Slides .. each	2 10 0	2 15 0	4 10 0	6 0 0
Extra Brass Bound Double Slides ..	3 0 0	3 5 0	5 5 0	6 17 6

Messrs. Cole, Marchent & Morley, Ltd., Prospect Foundry, Bradford, write:—"We congratulate you on the careful attention shown to a number of details which are often omitted."

Jno. B. Scrivenor, Esq., Government Geologist, Federated Malay States, writes:—"The whole-plate camera gives every satisfaction."

The "Sinclair" Adjustable Lens Hood & Screen Holder



Lens Hood open.



Closed.

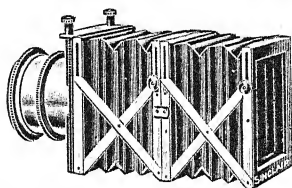
PREVENTS
FOGGY NEGATIVES

A Typical Testimonial

Sheffield.

Lens Hood to hand. It is a beautiful piece of workmanship and very efficient. I have already used it with great success.

W. F. A.



Hood with Extension for Tele-photography.

"The practical photographer will be wise in regarding this accessory as an indispensable part of his equipment."

British Journal of Photography.

No one who has once used the bellows hood of this form is likely to expose another plate without it. It enormously increases the brilliancy of the result and permits of photographs being taken against the sun, which would otherwise be impossible. This new type of Sinclair Lens Hood is not only adjustable as regards the extension, but also in its range for fitting to the hoods of lenses, and consequently the same lens hood will fit a large number of lenses, and the vice grip permits of it being securely held in position. Each hood is also fitted with a spring screen holder, permitting screens to be instantly changed or removed. The same screen will therefore suffice for any lenses which the hood will fit, and the necessity for special caps or screw-in cells is obviated. In cases where lenses are fitted to shutters or are in sunk mounts, a small metal hood to screw into the front cell of the lens may be necessary, which we, or any maker or dealer, would supply.

Size.	Adjustable to fit Hood of Lenses from	Extension up to	Size closed.	Price.	K1, K11, XI or XII Screen to fit.
No. 00	.. 1 to 1½ in.	2½ in.	3 × 2½ × 1	25/-	8/-
No. 1	.. 1½ to 2 "	2½ "	3½ × 3 × 1½	30/-	10/-
No. 2	.. 2 to 2½ "	3 "	4½ × 3½ × 1½	35/-	12/9
No. 3	.. 2½ to 3 "	4 "	5½ × 4½ × 1½	57/6	18/6
Large Hood.	5½ × 4 in.	5½ in.	5½ × 7 × 1½	60/-	—

For Studio and Kine Cameras.

Collapsible Extensions may be had for Nos. 1 and 2, and these increase the lengths when open to 4½ and 6 inches respectively. Such extensions cost for No. 1, 20/-; and No. 2, 25/-. They are very advisable for Tele-photography.

THE

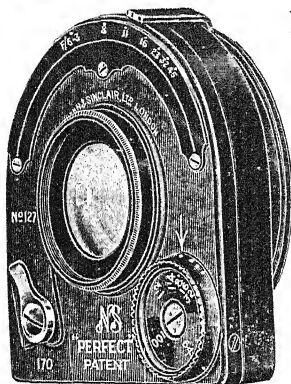


SHUTTER

Newman-Sinclair Patent

The only Shutter giving the range of speeds required by the pictorial worker.

NO VARIATION
GREAT EFFICIENCY
SMOOTH IN ACTION



The "N.S." Patent Shutter has been designed for the use of workers who want a shutter on which the engraved speeds approximate to the actual ones. It is well known that the types of diaphragmatic shutters in general use are very defective in this matter. They are made by the thousand, and dial plates cast or engraved in quantity are fitted without any relation whatever to the real speeds. As a general rule Continental shutters are so constructed that

there is a very rapid transition from slow to quick speeds, quite irrespective of the markings on the shutter, and we may get an alteration in the speed from $1/8$ th to $1/70$ th of a second with only the slightest movement on the speed dial.

The Accuracy of the "N.S." Shutter. Unless the photographer has a shutter of which the speeds are approximately correct, bad work is inevitable. The "N.S." Patent Shutter is so constructed that the above-mentioned defect is non-existent and in its manufacture we have endeavoured to give those speeds that are the most useful for the practical photographer. Moreover each shutter is individually tested for speed, and each dial plate is separately engraved. The speeds we set the shutter at are those that work conveniently with the lens apertures. The shutters are engraved $1/2$, $1/4$, $1/8$, $1/16$, $1/32$, $1/64$ and $1/100$ th of a second; and the speeds that will be found of the greatest use to the hand camera worker are $1/8$, $1/16$ and $1/32$ of a second, the latter being fast enough for all ordinary moving street traffic. Intermediate speeds between any of the two engraved speeds can be given if desired, and also "Time" exposures. The shutter may be opened for focussing without the necessity for changing the speed dial.

The Efficiency of the "N.S." Shutter. The "N.S." Accurate Shutter has surprisingly high efficiency owing to the fact that it opens and closes quickly and remains full open for the greater proportion of the indicated exposure.

The Release. The Shutter has a hand release which is in the most convenient position for work when the shutter is fitted to a camera, the fingers being then below the baseboard and the thumb used to actuate the release. An Antinous release may be used, and this is screwed into a hole just below the hand release pin. This convenient position does not get in the way of any movements and allows such a release to be shut up inside the camera when desired.

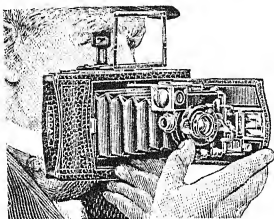
No. o Size	..	Iris Aperture.	Tube Diameter for Lenses.	Price.
No. 1	..	$7/8$ in.	$1-1/16$ in.	£4 0 0
No. 2	..	1 in.	$1-3/8$ in.	4 0 0

When Lenses are ordered from us fitted to this Shutter there is no extra charge for fitting. The charge for fitting customers' own lenses range from $17/6$ to $30/-$

The Sinclair Frame Finder and View Meter

Saves Plates, Films and Disappointment

The unreliability of many camera finders has led to our designing new types of frame finders, which have many advantages over those previously placed upon the market.



THE SINCLAIR FRAME FINDER can be kept on or removed from the camera as desired.

THE SINCLAIR FRAME FINDER is collapsible and goes into a very small space.

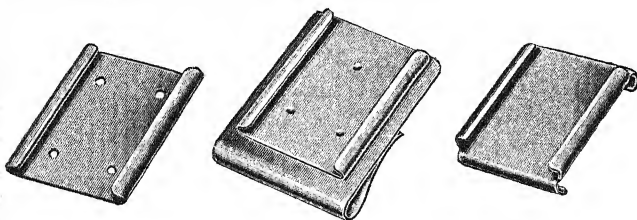
THE SINCLAIR FRAME FINDER can be accurately adjusted to show the picture taken by any camera with a large range of lenses.

THE SINCLAIR FRAME FINDER is equally suitable for the professional with a large stand camera, as for the amateur with a Vest Pocket Kodak.

THE SINCLAIR FRAME FINDER permits of the camera being used at the eye level—the natural position.

THE SINCLAIR FRAME FINDER consists of a collapsible frame made of brass, attached to a base in the form of a lazy tong that has at the other end a folding sighting plate. When closed, it measures $3\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{2}$ and weighs only 2 oz.

The finder is designed to slide into a variety of fittings that are made for all types of camera. When not in use, the folded finder can be kept on the camera or, if more convenient, carried in the waistcoat pocket.



No. 1

No. 2

No. 3

THE SINCLAIR FRAME FINDERS are made in two types and each type can be had with 3 kinds of fitting.

Type 1. For plates and films of the normal proportions, such as $\frac{1}{2}$ -plate, 5×4 in., $\frac{1}{4}$ -plate, etc.

Type 2. For long narrow pictures such as given by the V.P.K.; No. 1A, and 2C Kodaks, and postcard size.

The fittings are as follows:—

No. 1. Standard fitting, for cameras with wooden bodies to which the fitting can be screwed, and into which the Finder fits.

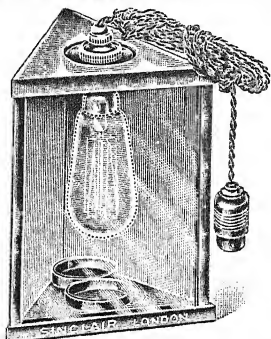
No. 2. Spring fitting, for attachment to metal cameras such as Folding Brownies, Carabines, Ensigns and V.P.K. Models B and III.

No. 3. Special fitting for use on the original Vest Pocket Kodak, no screwing being necessary.

Price:

Either type of Finder with one fitting of either number 6/-
Extra fittings Nos. 1 and 3 .. each 9d. Extra spring fittings No. 2 .. each 1/6

The "Sinclair" Folding Copper Lamp



This Lamp is a thoroughly well made lamp, constructed of copper in such a way that it will take the usual safelights $8\frac{1}{2} \times 6\frac{1}{2}$ in., and is arranged with "bayonet" or "screw" adapter for attachment to electric light fittings. Where there is no electricity, the aperture which takes the electric light fitting is closed by means of a screw cap, and either "Sinclair Devolights" or Fairy Night lights may be used for illumination. Folding flat and being non-rustable, it will be welcomed by travellers.

The price, complete with 6 ft. of flexible wire and lamp attachment, together with one $8\frac{1}{2} \times 6\frac{1}{2}$ in. Wratten Safelight of any grade, is	35/-
Extra adapter so that Lamp can be used with either "bayonet" or "screw" fitting	5/6
Extra Safelights each	5/6
Tropical "Devolights" for use with this Lamp, if electricity is not available per doz.	2/6
When ordering, state whether Lamp is required with "bayonet" or "screw" fitting.	

The Micro-Telescope



AS MICROSCOPE



AS TELESCOPE

Serious photographers are generally interested in geology, botany, or natural history, and to them this Micro-Telescope will particularly appeal. When closed it is quite small, measuring only $6\frac{1}{2}$ in. long, and then it forms an effective microscope, magnifying approximately 24 diameters. All that is necessary is to put the instrument on to the edge of the table or object it is desired to magnify, and then by simply inclining the tube while looking through it, all the magnified details will be clearly seen. As a telescope it is brought to the eye in the usual fashion, and the magnification is approximately 8 diameters.

The price, in pocket purse case, is 32/6

The "Sinclair" High Power Focussing Magnifier X.6

Will be appreciated by those doing copying work or in subjects where very critical focussing is essential. Glasses with great magnifying power are usually so short that it is difficult to get the head sufficiently close to the ground glass focussing screen. In the case of the "Sinclair" Magnifier the tube is $6\frac{1}{2}$ in. long, and the end which is placed into contact with the ground glass is sufficiently large to keep the glass steady when moving it over the surface. It reverses the image and consequently the picture on the screen is seen the right way up.



It is sold in a leather covered carrying case measuring $6\frac{1}{2} \times 1\frac{1}{2}$ in., and the weight, complete with case, is $6\frac{1}{2}$ oz.

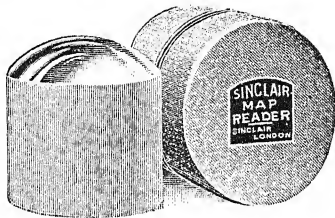
Price, in case complete £2 2 0

The "Sinclair" Map Reader

This Reader consists of a solid block of glass, which stands on the map, photograph, postage stamp or other article which it may be desired to examine. No special focussing is necessary, and motorists can examine details of their maps without stopping their cars. Curio collectors will appreciate the ease with which they can examine details of the signature, etc.

The Reader is sold in a leather covered case, measuring $1\frac{1}{2} \times 1\frac{1}{2}$ in. (45×45 mm.), and the weight is $4\frac{1}{2}$ oz.

Price, in case complete .. 7/6



Pen Microscope

These microscopes have the great advantage that they possess high power in a small space, and are wonderfully convenient to use. The No. 1 pattern is like a fountain pen in appearance and magnifies 25 times. The No. 2 pattern as illustrated is rather larger in size, and is fitted with achromatic lenses giving larger field



and magnification (40 to 60 times). The end of the microscope is placed on the surface to be magnified, and a sliding stud enables sharp focus to be secured. They are invaluable for examining signatures, botanical specimens and any fine detail.

No. 1.	25 times	5/-	each	
No. 2.	40 to 60 times	17/-	"	with pocket case 20/-
No. 2A.	Ditto. Screw focussing ..	20/-	"	with pocket case 22/6
No. 3.	40 to 120 times, with stand	65/-		



THE



UNIPOD

Invaluable for users of clockwork driven Ciné Cameras and greatly appreciated by hand-camera workers who wish to give the slower exposures satisfactorily.

It is impossible to do justice to this well-designed Unipod in our illustration. In appearance it is like a walking-stick when closed, beautifully finished with black enamel, and is $37\frac{1}{2}$ inches long. It extends to 68 inches and is absolutely rigid. It is constructed of drawn steel tube, and the inner section is nickel-plated with dull finish as a protection against rust. The black wooden knob is removed for use, and it can be supplied with $\frac{1}{4}$ -inch Whitworth or Continental screw thread. When a camera is on this Unipod it can easily be held rigidly for exposures of $\frac{1}{4}$, $\frac{1}{8}$ and $\frac{1}{16}$ second.

Weight $1\frac{1}{2}$ lb.

HERBERT G. PONTING, ESQ., F.R.G.S., writes: "I am delighted with the Unipod. It will be indispensable to me in the future."

Price .. 35/-

Adapter, so that Unipod can be used with both $\frac{1}{4}$ Whitworth and Continental thread — 7/6

Leather Sling Handle — 1/9

The Pen Print Trimmer and Retouching Lancet



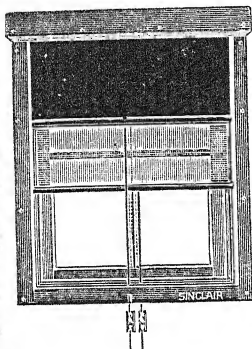
This admirable little instrument should be kept in every photographer's pocket, or on the workroom table. For trimming prints, scraping out defects, or inserting a high light it is the best tool available, and being made of the finest steel it can be sharpened to a keen edge.

Nickel Boxes containing 20 Lancets

Price, including Holder — per box $1\frac{1}{6}$

The Sinclair Dark Room Blinds

AT ONCE CONVERT ANY ROOM
INTO A DARK ROOM



"One of the things which we all at times make, or get made for ourselves, usually in a rather unsatisfactory way, has been done very well indeed by Mr. J. A. Sinclair's firm."—*British Journal of Photography.*

This consists of a well-made varnished wood frame with two grooves, in which red and black blinds travel, and when both are down no trace of white light is admitted. We make the fitting to any measurements, and we shall be pleased to give quotations on application. Screws are supplied with the blind, and all that is necessary is to screw it to the window frame.

Specimen Size and Price :

Size about 5 ft. × 4 ft.	..	..	£9 0 0
" " 7 ft. × 4 ft.	..	..	10 0 0

Quotations given for any size.

Dark Room Radiant Timer

Panchromatic and Colour Plate workers in particular will



appreciate this new kind of luminous watch. The large figures on the outer edge indicating the seconds, and on the inner scale from 0 to 10 indicating minutes, as well as points for each second, are made of a very radioactive compound which shows clearly in the dark. A pressure of the knob at top starts the two luminous hands from zero, a second pressure stops them, and a further pressure returns them to zero again. The luminosity is greatly intensified if the timer is held near an electric light bulb before commencing work.

Price — £2 15 0

Sinclair Bromoil Requisites

BOOKS.

"Bromoil and Transfer," by L. G. Gabriel..	7/6
"Oil, Bromoil and Transfer," by Fred Judge and F. C. Tilney ..	1/-
"The Art of Pigmenting," by Bertram Cox and F. C. Tilney ..	1/-
"Expression in Pigmenting," by F. C. Tilney ..	1/-
"Perfection in the Pigment Processes," by Chris. J. Symes ..	1/-
"How to make a Bromoil Print," concise instructions by James A. Sinclair, F.R.P.S. ..	Post free on application.



Sinclair Trial Outfits

Containing the essential requisites for beginners, with Bromoil.

Boxed complete.

Price 10/6

Postage in U.K. 9d. extra.

PAPERS FOR THE BROMOIL PROCESS

Double Weight : White, Smooth or Rough : and Cream, Smooth or Rough.

6½ × 4½	8½ × 6½	10 × 8	12 × 10	15 × 12
7 pieces	6 pieces	1/6	2/2	3/3
1/3	12 pieces	3/-	4/2	6/4
				15 × 12 per doz. 4/11

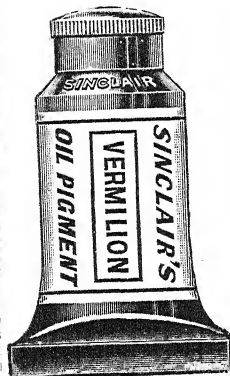
ACCESSORIES

Compressed Fibre Slabs—for pigmenting, 10 × 8	2/-	12 × 10	3/-	15 × 12	4/6
"Clairo"—a non-inflammable fluid for cleaning oil pigment brushes—				per bottle, 1/6 and	2/6
Pigmenting Palettes—plate glass, ground surface and edges. This is the best palette ..	..	..	..	..	3/-
Palette Knives ..	..	..	..	..	2/-
Blotting Boards—special thick, fluffless, 25 × 20, 5d. per sheet; per doz.					4/-
Retouching Lancets—for removing defects or scraping up lights in prints—(see page 462) ..				per box	1/6
Oil Strumps—for retouching and putting lights in wet prints, per doz., No. 1				5d.	
No. 2, specially fine ..				per doz.	6d.
Spirit Sensitizer—for Oil prints, including Blanchard brush, per bottle				..	1/9
Flat Hog Hair Brushes—for use with Spirit Sensitizer ..				each	3/-
Tabloid Sensitizer—(B. W. & Co.) ..				per carton	1/-
Metal Clips—for hanging up prints to dry ..				per doz.	2/3
Varnish for Oil Prints ..				per bottle	1/9 and 4/-
Ditto, French ..				per bottle	2/3
Plastic Rubber—This may be moulded to any shape and is most useful for working on wet prints ..				per piece	4d.
SINCLAIR FINISHING RUBBER—For strengthening lights on any prints. Almost magical in its effect ..				per piece	6d.

SINCLAIR'S IMPROVED BROMOIL PIGMENTS

ARE THE EASIEST TO USE

Colours.



BLACK,
BROWN,
BROWN BLACK,
SEPIA,
WARM SEPIA,
BURNT UMBER,
COBALT BLUE,
ULTRAMARINE,
INDIGO,

BURNT SIENNA,
ZINC WHITE,
VERIDIAN GREEN,
FOLIAGE GREEN,
CADMIUM YELLOW,
LIGHT YELLOW,
RED CHALK,
VERMILION,
CRIMSON LAKE,

ENCRE MACHINE. A hard warm black ink.
ENCRE TAILLE DOUCE. A soft ink to mix
with Encre Machine

These two last are the inks used by
Messrs. Demachy, Puyo, Read, etc.

All above colours 1/3 per tube.

Special Colours for Three Colour Work,
2/6 per Tube.

MEDIUMS for thinning the Colours.

The Roberson Medium—For quick drying
6d. per Tube.

The Sinclair Bromoil Medium—A slow drying medium especially useful in
the Transfer Process. 2/3 per large tube.



The Sinclair Bromoil Bleacher

Needs no Acid Bath and
makes Pigmenting a pleasure.

The Sinclair Bleacher is made from our improved
formula, which enables a Bromoil to be made from a
more delicate print than is usual with work of the
published recipes.

It is used by many leading experts.
10 oz. concentrated solution .. 2/-
Post Free in U.K., 2/6

Sinclair Bromoil Brushes

Genuine Pole-cat Fitch Brushes.—These are undoubtedly the best brushes for Oil and Bromoil work and will last for years if carefully used.

No. 1, 1/6	*No. 5, 2/6	No. 12, 7/6	No. 18, 16/-
No. 2, 1/7	*No. 8, 4/6	No. 14, 9/6	No. 20, 22/6
*No. 3, 1/10	*No. 10, 6/-	No. 16, 12/6	No. 24, 31/6
	No. 28 ..	50/-	

Small size for detail work B, 8d.; C, 9d.; D, 10d. each.

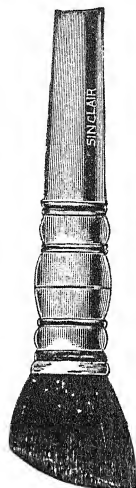
*Nos. 3, 5, 8 and 10 are also supplied "straight cut" instead of bevel shape and are for use with a "Hopper."

"B" Series Bromoil Brushes.—These brushes were introduced by us when pole-cat hair was practically unobtainable and are of excellent quality but have less resiliency.

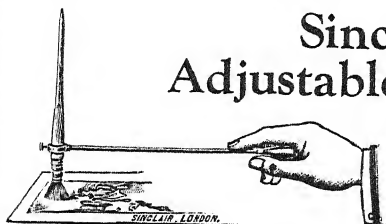
No. 0, 1/-	*No. 5, 1/6	No. 14, 3/6	No. 24, 9/-
No. 2, 1/3	*No. 8, 2/-	No. 18, 6/-	No. 28, 10/6

"Mortimer" Brush.—This Brush is made of long and fine hog hair, shaped like our Fitch Brushes, and will be appreciated by those who desire broad effects. It is used by the Editor of the "Amateur Photographer."

No. 1, 1 1/2 in. ..	3/6	No. 3, 1 1/2 in. ..	6/9
No. 2, 1 in. ..	5/-	No. 4, 1 1/2 in. ..	7/6



Sinclair Adjustable Hopper



A valuable adjunct for increasing contrast over small areas and for working clouds into the sky.

Price 2/6 each.

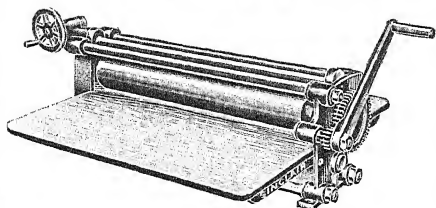


A NON-FLAM CLEANING FLUID

For Cleaning Oil Pigment Brushes, Invaluable for Cleaning and Restoring Ciné Films, and the Best Cleanser and Cleaner for the Home. Cleans without injuring Silks, Satins, Woollens, Linens, Kid Gloves, and Shoes Gramophone Records or Typewriters.

Bottles, 1/6 and 2/6 each.

Bromoil Transfer Press



The beauty of the transfer process appeals to everyone. By its means is obtained a peculiar quality very similar to that of photo-gravure. This Press is specially designed for the process, its features being :—

Perfect alignment of rollers, eliminating the need of a blanket, and ensuring a clear cut impression without creep.

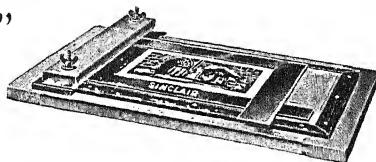
Simple and effective pressure loading device, giving the finest adjustments by the single motion of the hand wheel.

Ease and evenness of operation through the reduction gearing of ratio 3 to 1, giving easy turning with one hand.

Dimensions :—Roller Diameters $3\frac{1}{2}$ inches. Effective Width of Rollers 20 inches. Table 23×23 inches. Approximate Weight 100 lb.

Price, inclusive of Zinc Sheets £11 15 0

The "Revelle" Bromoil Transfer Desk



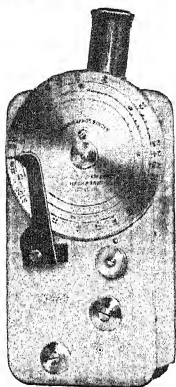
This desk was designed by Mr. A. Hamilton Revelle, a very clever and artistic worker, and it is particularly adapted for those who work in the smaller sizes, say up to $8\frac{1}{2}$ in. by $6\frac{1}{2}$ in., or who wish for further power of control when transferring.

It consists of a drawing board 16 in. by $11\frac{1}{4}$ in. in which is framed a piece of plate glass. Two zinc squares are adjustable to hold the reversed Bromoil print, and these, as well as the transfer paper, are firmly held in position by a clamping board at one end of the desk.

The transfer is made by pressing a "tool" on the back of the transfer paper. With this desk re-inking is unnecessary. The progress of the print can be repeatedly examined, and continued action of the "tool" on the back of it will gradually increase the strength in that part. It is evident that this desk affords scope for much selective treatment in pictorial work. Price, 25/-

Postage and packing in the U.K. 1/-

Transfer Tools, 3/- each.



THE "SINCLAIR" RANGE FINDER

IS THE PERFECT ONE-MAN
INSTRUMENT

Some advantages and uses of
the "Sinclair" Range Finder

MILITARY

It can be used for taking ranges and dimensions of any distant object with great exactness by one man.

It registers the ratio of distance to base, and makes the base at the point observed.

It will measure the distance of an object without the observer having to move in a lateral position.

It may be used as a Depression Range Finder, without the necessity for a pedestal or levelling.

It can be used during attack, when, owing to enemy's fire, only a momentary observation is possible and will give the range without the necessity for leaving cover.

NAVAL

It may be used as a Range Finder from a fighting top.

It may be used from sea level when attacking permanent land fortifications.

It is the best instrument for Station Keeping and Coast Navigation.

It is unrivalled for rapid sextant work when it is advantageous to avoid the delay of consulting mathematical tables.

SURVEYING

It is the best instrument for Rapid and Accurate Survey Work, used in conjunction with a Plane Table.

The "Sinclair" Range Finder does not need a definite Base, Mathematical Tables or Difficult Calculation.

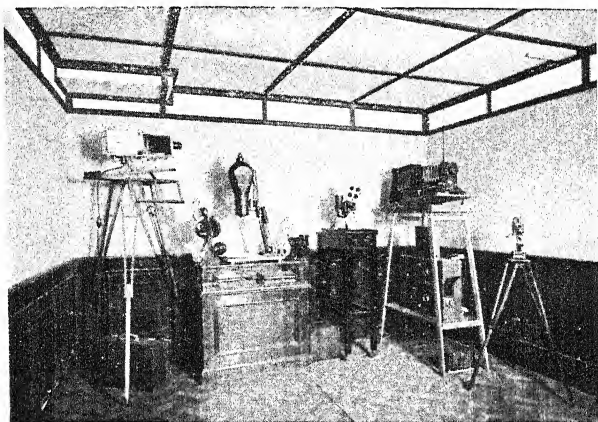
Weight in case complete, 2 lb.

Price, including leather sling case £7 10 0

Send for Descriptive Booklet.

We Specialise in Moving Picture Apparatus

Don't neglect making moving-picture records of your Home-Life or Holiday Scenes. They will be of the greatest interest in years to come.



Our Optical and Ciné Projection Room, 3 Whitehall.

We stock all the leading makes of Ciné Camera and Projectors and our clients can compare them in comfort and have our helpful advice.

Catalogue post free on application.

The "Sinclair" Legible Thermometer

This thermometer will be found of great value when working with red and green safe lights, the scale being a very open one, and the figures of a large size.



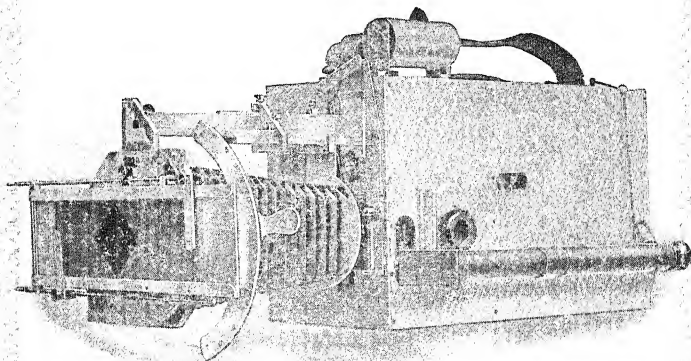
The former has a range of from 40° to 120° F. and the scale is of opal contained in a glass tube and consequently unaffected by chemicals. The mercury tube has a magnifying lens front. The thermometer is sent out in a cardboard case and is 8½ in. long.

Price 6/6



STANDARD
KINE' CAMERA
with HAND and
ELECTRIC DRIVE

(NEWMAN & SINCLAIR'S PATENTS)



Showing camera fitted with "N.S." Vignetting and Dissolving Apparatus.

THIS CAMERA CAN NOW
BE SUPPLIED WITH
TRANSFORMER AND RECTIFIER
FOR USE WITH
ORDINARY ELECTRIC SUPPLY

It holds 400 feet, 35 mm. Film.

THE "N.S." STANDARD KINE' CAMERA—*contd.*



Copyright Mount Everest Committee.

Captain J. Noel, F.R.G.S., with the "N.S." Camera at 23,000 feet
filming the climbing party at 25,500 feet.
as supplied to the

ROYAL GEOGRAPHICAL SOCIETY
for the wonderful film
CLIMBING MOUNT EVEREST
and amongst others to

H.M. WAR DEPARTMENT.
NEW ZEALAND GOVERNMENT.
MESSRS. MARCONI.
MR. HERBERT G. PONTING, F.R.G.S.
THE METROPOLITAN MUSEUM OF ART, NEW YORK.
THE NEW YORK ZOOLOGICAL SOCIETY.
MAJOR RADCLYFFE DUGMORE and
MR. CHERRY KEARTON.

We have no hesitation in stating that our No. 3 "N.S." Kine' Camera is the most perfect instrument that has ever been made for the highest class Studio or Topical work, and is equally without peer for the Explorer, or Scientist.

In general form the No. 3 Model is something like the Newman-Sinclair instruments which achieved so much success in the Great War, but the details of construction are such as to meet the demands of advanced modern studios where "effect" studies play a prominent part. The No. 3 "N.S." Kine' Camera greatly simplifies the production of the most elaborate effects, while its accuracy and reliability of construction makes it pre-eminent in this and every other sphere of moving picture photography.

THE 'N.S.' STANDARD KINE' CAMERA—*contd.*

SPECIFICATION:

Camera built entirely of metal, all parts being milled out of the solid, no castings being used. The metal is almost as light as aluminium, but is free from that metal's instability, and in its general characteristics and properties for standing shocks and strains resembles mild steel. Being light in colour, it reflects heat, and is therefore particularly adapted for tropical climates.

All works easily visible when the doors are opened, and every part accessible for cleaning.

Reversing action by merely turning the handle backwards. No bands to be shifted.

Square Film Boxes (holding 400 ft.) entirely without projections which automatically gear when placed in the camera. The absence of projections and the square form make them the most convenient for packing and transport. These boxes are provided with mouths which automatically open when closing the camera and they entirely obviate electrical markings or "static."

Automatic Shutter "fade out" and "fade in," by merely pressing a lever when the camera is running. It works equally well when running forward or backward and the normal "fades" take place in 5 ft. or 10 ft. of film, at the will of the operator. The "fade" can be arrested in any position, either in opening or closing. Shutter alterable to any size at will, from the outside of the camera.

Film Counter. This is at the back of the camera, and shows the amount of exposed film in the camera, and the length of a single picture determined at any moment. Each individual picture is recorded, and can be returned to after exposing any length of film.

Focussing can be accomplished by three methods. Firstly, by a reflex focussing arrangement which carries a magnifying eye-piece or periscope on the side of the camera. Secondly, by an accurate scale focussing seen from the back of the camera. Thirdly, by a prism eye-piece for magnifying the image through the film itself.

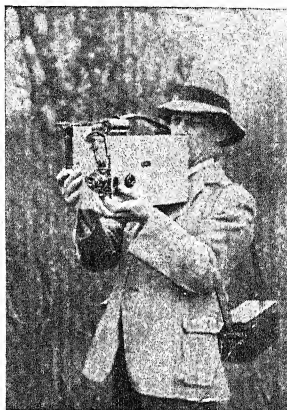
Iris worked from the back of the camera, by the movement of a lever, accurately scaled. The same scale may be adjusted to automatically work with both 2 and 3 in. lenses, without alteration.

Masks of any design can be inserted or removed without opening the camera and film is consequently saved.

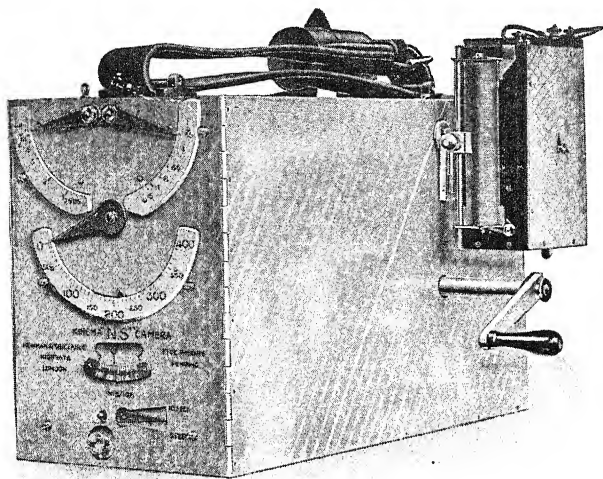
Lenses interchangeable on interchangeable fittings, which can be attached or detached with one hand only.

Single picture handle always in position.

Brilliant Finder. Each camera is supplied with a brilliant finder, which is quickly attached or removed from the top of the camera, and this finder is without parallax. Masks are supplied to fit the finder, so that the correct image can be seen with lenses of any focus.



Major A. Radclyffe Dugmore with the "N.S." Standard Kine' Camera with Automatic Electric Drive.

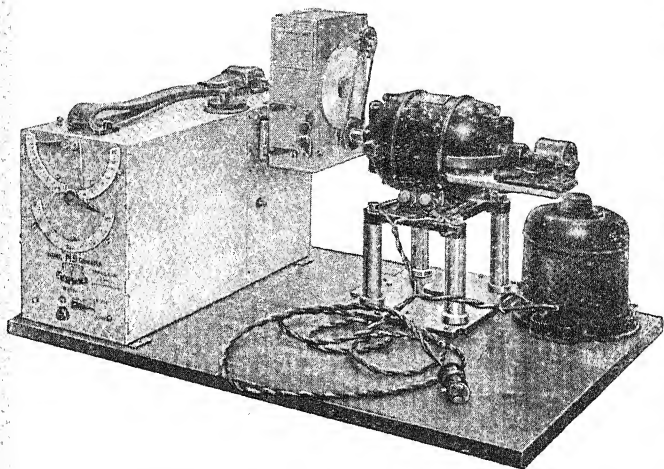
THE "N.S." STANDARD KINE' CAMERA—*contd.*

The "N.S." Standard Kine' Camera with Automatic Electric Drive, the back of the Camera shows Counter, Iris and Focussing Levers, Fade Away Lever, and Film Marker.

The "N.S." Automatic Electric Drive. Owing to the extraordinary ease with which the "N.S." Kine' Camera runs, we are able to drive it with a small motor that only weighs 2½ lb. The power for the motor is obtained either from any ordinary electric supply, or from a battery which with its containing box weighs 9½ lb. and will drive 4,000 ft. without recharging. When the camera is intended to be used with the ordinary electric supply we should be informed of the voltage and whether the current is direct or alternating. A Transformer and Rectifier both light and portable are then sent with the outfit. For those who require it, we also provide a Relay Instrument complete in box, by means of which the camera can be started and stopped at any distance up to 100 yards, and longer distance relays can be made to order. Full particulars will be found in our Kine' Camera Catalogue.

The "N.S." Vignetting and Dissolving Apparatus. This apparatus is carried on the front by means of an extension arm, detachable in an instant. It consists of bellows fitting carrying at the front our Improved "N.S." Iris Attachment and Adjustable Card Carrier. This iris can be set to vignette any portion of the picture, and is so constructed that it gradually and entirely closes and it can also be set to open or close to any definite point desired. The front card holder enables a roller blind or curtain effect to be produced, or by cutting cards to any desired shape, parts may be vignettted off. A second attachment forms a most complete vignetting device, which enables squares, rectangles, ovals or blind effects to be produced at any part of the picture and the action is controlled exactly and with great sweetness by a simple lever movement. The metal portions of these attachments are constructed of the same metal as the body of our cameras; they close up into a very small space when not in use, and only weigh 3 lb.

THE "N.S." STANDARD KINE' CAMERA—*contd.*



The "N.S." Standard Kine' Camera as supplied to Cambridge Zoological laboratory, taking pictures at speeds from 10 to 40 per second and with geared control to take pictures at intervals of 1, 2, 4, 8, 16 and 32 seconds, for use with mains current.

Concerning the tour of H.R.H. The Prince of Wales in South Africa and South America, H. Bruce Wolfe, Esq., of the British Instructional Films, sent the following extract from a report by Mr. Barkas, their chief Operator:—

"I find that it is very handy, light in weight, simple in operation and exceedingly quick off the mark. It is silent. As a machine for this type of work, or for work in the Tropics or in severe cold, I would recommend the Newman-Sinclair."

Mr. Harry Burton, of the Metropolitan Museum of Art, New York writes:—

"The Camera acted splendidly as always."

Captain J. Noel, F.R.G.S., the official photographer to the Mount Everest Expedition, writes:—

"At all times the camera behaved perfectly, and during all my climbs I found the apparatus never a burden but always a pleasure to operate. I could not have got my pictures unless my camera had been so portable and efficient."

The "N.S." Camera is the easiest camera to thread, using a minimum quantity of film and can be threaded as easily backwards as forwards. It is the lightest running camera ever made.

Size of Camera with 2 film boxes, $14 \times 5\frac{1}{2} \times 8$ in. ($355 \times 146 \times 204$ mm.). Weight, 18 lb. 5 oz. (8.3 kilos.).

THE "N.S." STANDARD KINE' CAMERA—*contd.*

Net Cash Prices in London

FOR TOPICAL USE.

	Price. £ s. d.	Code Word.
No. 3 "N.S." Standard Kine' Camera, as described, without the iris and dissolving attachment for front of camera	200 0 0	SPADROON
Ditto, with electric motor and battery	225 0 0	SPAGAT

FOR STUDIO USE.

No. 3 "N.S." Standard Kine' Camera, as described, with either 1½ or 2 in. F/3.5 Ross "Xpres" Lens, complete with 2 film boxes, "N.S." brilliant finder, reflex focussing finder with periscopic tube attachment, fade out to shutter, front adjustable iris with fitting for blind effects and attachment for every kind of studio dissolving effect, to bring diamond, square, rectangular, or oval cut-off to any part of the picture	225 0 0	SPADATTI
Ditto, with electric motor and battery	250 0 0	SPAETROSE
Ditto, with electric motor, Transformer and Rectifier for use with any ordinary electric supply	270 0 0	SPALASSI

EXTRAS AND SPARES.

Duralumin Light-tight Film Boxes, each holding 400 feet each	8 10 0	SPAHEES
Relay Instrument complete in box, for driving camera at any distance up to 100 yards ..	20 0 0	SPAIANDO
"N.S." Geared Mechanism for automatically taking slowly moving objects. Taking single pictures in 1, 2, 4, 8 or 12 seconds	20 0 0	SPAIATE
Extra Batteries for use with automatic drive, each sufficient for 4,000 ft. of film without re-charging each	5 0 0	SPALAX
Set of 12 Masks in case	4 10 0	SPADICOSE
Best hand-sewn solid leather case to hold No. 3 Kine' Camera and finders	6 16 0	SPADDLE

Supplementary Lenses with Control adjustments for focussing and altering diaphragms from back of the camera.

1½ in. (.37 mm.) F/3.5 Ross "Xpres" Lens Special	15 10 0	SPANADER
3 in. (.75 mm.) F/3.5 Ross "Xpres" Lens ..	15 10 0	SPADONIES

Supplementary Lenses in "N.S." Special Helical Focussing Mounts, Hoods and finder masks.

4 in. F/3.5 Ross "Xpres" Lens	15 0 0	SPANIOPEs
5½ in. F/3.5 Ross "Xpres" Lens	17 10 0	SPANKALB

For Telephoto Lenses and other fittings see Kine' Catalogue.



AUTO KINE' CAMERAS

(Newman and Sinclair's Patents)

**REGULAR, STUDIO
and
SLOW MOTION
MODELS**
are the most marvellous
clockwork driven cameras
in the world.

Amongst notable users may be mentioned:—

H.M. Admiralty.
H.M. Air Board.
H.M. Post Office.
The Empire Marketing Board.
The London County Council.
British Instructional Films.
Stabilimenti Cines, Rome.
Major Court-Treatt.
Major Radclyffe Dugmore,
F.R.G.S.
Captain J. B. L. Noel, F.R.G.S.



Using the "N.S." Auto Kine' on a
"N.S." Unipod.

The Regular and Studio Models now hold 200 feet standard 35 mm. film all driven in one winding.

The Slow Motion Model holds 100-feet standard film driven in one winding.

The "N.S." Auto Kine' Camera is the only instrument capable of exposing 200 ft. 35 mm. film with once winding and at a practically constant speed throughout the run within a variation of only 4 per cent. The speed can be varied from 10 to 24 frames per second. The starting and stopping are instantaneous, and no film is wasted in getting up speed. No tripod is necessary when using normal focus lenses, and the camera can be used as easily as a hand camera.

The addition of a Unipod relieves the operator from supporting the weight of the camera and does not detract from its portability or the facility with which it can be directed and operated. With the "N.S." Auto Kine' Camera one may photograph from the ground level or from the top of a ladder, in a crowded sports ground, or from an aeroplane. It may be pointed directly upward or directly down, or the camera can be inverted for taking reverse action pictures. Separate film reservoirs are used, and a new film can be placed in the camera in 10 seconds.

Almost any focus lens can be fitted, and the method of changing lenses is simple and expeditious. Each lens in its mount carries its own focussing scale.

THE "N.S." AUTO KINE' CAMERA—Regular Model—contd.

SUPPLEMENTARY FITTINGS FOR SPECIAL WORK.

A Reflex Focussing Finder can be had which magnifies the image, and by its use close up pictures and those given with Tele-photo Lenses can be correctly focussed. For scientific work, extension tubes can be supplied so that full sized or enlarged images may be obtained. Special means for releasing the camera from a distance, apparatus for delayed action, and focussing apparatus to be used in almost any position can be added. Means for focussing and setting the iris from the back of the camera can be supplied, and these can be operated if desired when the camera is in action. The camera may be used on an ordinary tripod, its automatic action leaving the operator with both hands free.

SPECIFICATION.

ITS CONSTRUCTION.

The "N.S." Auto Kine' Camera is made entirely of metal, Duralumin being used. The box-like shape makes it a very convenient instrument to handle and carry.

THE FILM BOX.

This box is made of Duralumin. It is rectangular in form without projecting mechanism. It holds 200 ft. of film, and into the same box the film is automatically wound after exposure. At any time the box can be removed from the camera in daylight and another box of film inserted in its place in from 10 to 15 seconds.

THE FINDER.

The Finder is self-contained, and is viewed by looking through the instrument. It shows the image the right way up and the right way round, and is adjusted to show the screen picture. Supplementary Finder Lenses are provided to suit the different foci of the camera lenses so that the real size of the finder picture remains constant although the angle of view is altered. This relates to lenses up to 4 in. (100 mm.) focus. Where longer focus lenses are supplied masks may be used, and in the case of very long focus lenses telescopic sight finders can be fitted. The film measuring index is visible in the finder, and the operator at all times can see the amount of film used.

LEVEL.

A level is placed under the measuring index in the finder and can be seen at the same time as the picture.

LENSES

The lenses normally fitted are the 2 in. (50 mm.) F/1.9 or F/3.5 Ross "Xpres" Lenses, and extra lenses can be supplied to any focus mounted on "N.S." Focussing Mounts. These mounts can be expeditiously removed from the camera, and are perfectly light tight.

THE MECHANISM.

The camera is driven by two springs, both of which are wound to the full at starting, but either spring can be wound at any time even when the camera is in action or running. Absolutely silent ratches are employed, so that no attention is drawn to the camera whilst winding.

A regulator permits the film to be driven at any desired rate from 10 to 24 frames a second, and provided the camera is loaded with fresh and properly perforated film it will drive the whole 200 ft. with one wind of the mechanism. The camera is provided with a punch to record the end of a picture and this is situated at the front of the instrument. The gate is designed to eliminate scratching or "static" markings and holds the film rigid while each picture is taken. It is easily removed when cleaning is necessary. The camera is loaded in a few seconds. There is no threading up.

Captain Roger Hilsman, United States Army, writes from Manila, Sept. 2, 1929:—

"You may refer anyone to me regarding the Auto Kine' Camera and it will be my pleasure to recommend it above all makes of clockwork-driven motion picture cameras. You have in me a living advertisement for your excellent product."

Copy of letter from BRITISH INSTRUCTIONAL FILMS LTD.,

Regent Studio, Welwyn Garden City, Herts., Nov. 7, 1929.

"Dear Sirs,

I have recently returned from the Sudan where I have been making the film 'STAMPEDE' for the above Company.

THE "N.S." AUTO KINE' CAMERA—Regular Model—*contd.*

SPECIFICATION—continued.

I know you will be interested to get a report on the two clockwork cameras you supplied, and can say quite frankly that these proved an unqualified success. They never jammed and the pictures taken with them when projected are rock steady.

With regard to the distant release fittings you made to my order, we found these of the utmost use. The advantage of using this distant release with your camera for dangerous game is obvious. Dangerous animals can thus be allowed to walk right up to the camera, which was hardly advisable with a camera which had to be cranked by hand.

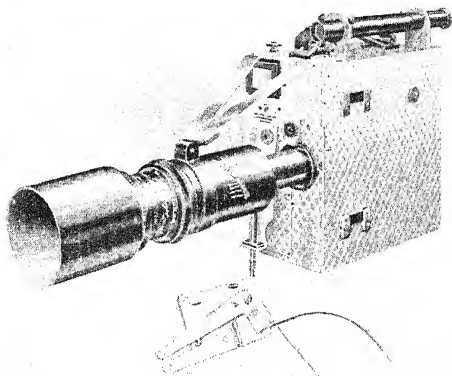
I should like to congratulate you on your clockwork cameras, and to assure you that, under the very roughest conditions, they never gave us a moment's anxiety.

Yours faithfully,

For and on behalf of

BRITISH INSTRUCTIONAL FILMS LTD.,

(Signed) C. COURT-TREATT.



The "N.S." Auto Kine' Camera fitted with 17 in. Telephoto Lens, special Telescopic Finder and Court-Treatt. Starting and Stopping Device.

NET CASH PRICES in LONDON of the "N.S." AUTO KINE' CAMERA and ACCESSORIES.

(REGULAR MODEL)

Size, $9\frac{1}{2} \times 4\frac{1}{2} \times 9\frac{1}{2}$ in. (24 x 12 x 24 cm.) Weight, 17 lb. (7.8 kilos.)	Price.			Code Word.
	£	s.	d.	
"N.S." Auto Kine' Camera complete with film box as described and 2 in. (50 mm.) F/3.5 Ross "Xpres" Lens . . .	120	0	0	SPEEDED
Ditto, with $1\frac{1}{2}$ in. (37 mm.) F/3.5 Ross "Special Xpres" Lens . . .	120	0	0	SPEDIEREN
Ditto, with 2 in. (50 mm.) F/2.9 Dallmeyer "Pentac" Lens . . .	122	5	0	SPEDITIVO
Ditto, with 2 in. (50 mm.) F/1.9 Ross "Xpres" Lens . . .	124	10	0	SPEECHFUL.
Best Hand-Sewn Solid Leather Case with lock and key and sling strap . . .	4	15	0	SPEEDING
Extra Film Boxes for 200 ft. 35 mm. film each . . .	8	10	0	SPEEDWELL

THE "N.S." AUTO KINE' CAMERA—Regular Model—*contd.*

Best Hand-Sewn Solid Leather Case for two extra film boxes	£	s.	d.	Code Word.
Best Hand-Sewn Solid Leather Case for two extra film boxes and extra lenses ..	3	15	0	SPEELBOU'T
Extra Cost of Reflex Focussing Device if ordered with camera	4	10	0	SPEELGOED
Devices for focussing and altering Iris Diaphragm from back of the Camera, with Lens Hood and Filter Holder	10	0	0	SPEEKJES
Court-Treatt Starting and Stopping Device ..	15	0	0	SPEILOCH
"N.S." Kine' Tripod with Revolving Top only ..	8	10	0	SPEIDEL
"N.S." Kine' Tripod with Universal Revolving and Tilting Top	33	0	0	SPELFONT
Set of two Cases for Kine' Tripod and Top ..	55	0	0	SPELLFUL
"N.S." Unipod (page 462)	4	10	0	SPELLASSI
	1	15	0	STABILIFY

SUPPLEMENTARY LENSES:

The price in each case includes the "N.S." Special Focussing Mount, Hood for Lens where necessary, and Finder Correcting Lens in frame fitting, for placing at the front of the regular finder lens, so that the view given by the finder will coincide with that given when using the supplementary lens. In the case of lenses longer in focus than 9 in. this finder lens is not supplied, but sighting pointers are fixed on the camera, and the Reflex Device for accurate focussing on near distances is recommended.

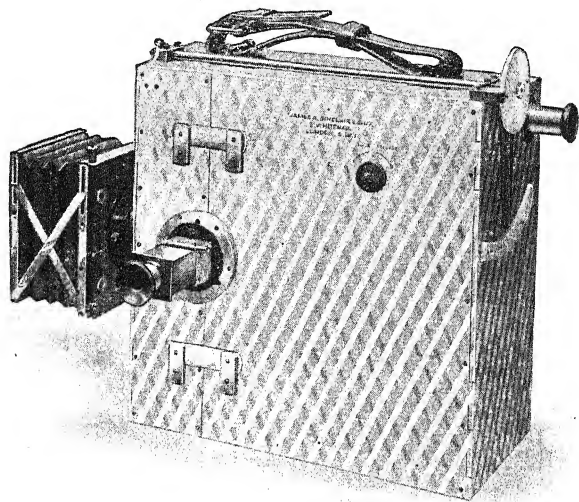
	Price			Code
	£	s.	d.	Word.
14-in. F/3.5 Ross "Special Xpres" and fittings as described	10	10	0	SPEELHOL
2-in. F/1.9 Ross "Xpres" Lens and fittings as described	15	0	0	SPEGNENDO
2-in. F/3.5 Ross "Xpres" Lens and fittings as described	10	10	0	SPEGNIATE
3-in. F/3.5 Ross "Xpres" Lens and fittings as described	11	10	0	SPEELKAS
4-in. F/3.5 Ross "Xpres" Lens and fittings as described	13	0	0	SPEELMAN
6-in. F/4.5 Ross "Xpres" Lens and fittings as described	14	10	0	SPEICHEN
64-in. F/5.5 Ross "Teleros" Lens and fittings as described	14	0	0	SPEELNOOT
9-in. F/5.5 Ross "Teleros" Lens and fittings as described	17	10	0	SPEIREES
11-in. F/5.5 Ross "Teleros" Lens and fittings as described	20	0	0	SPIESEN
13-in. F/6.3 Ross "Teleros" Lens and fittings as described	20	10	0	SPEKMES
17-in. F/6.3 Ross "Teleros" Lens and fittings as described	30	0	0	SPEKMUIS
17-in. F/5.5 Ross "Teleros" Lens with special fittings and telescopic finder	47	10	0	SPEKNEK
2-in. F/2.9 Dallmeyer "Pentac" Lens and fittings as described	12	15	0	SPEELSCH
3-in. F/2.9 Dallmeyer "Pentac" Lens and fittings as described	14	10	0	SPEELTUIG
4-in. F/2.9 Dallmeyer "Pentac" Lens and fittings as described	15	0	0	SPEEREN
6-in. F/3.5 Dallmeyer "Dallon" Lens and fittings as described	19	0	0	SPEERHAI
6-in. F/5.6 Dallmeyer "Dallon" Lens and fittings as described	12	0	0	SPEERKIES



AUTO KINE' CAMERA

STUDIO MODEL

THIS IS THE AUTOMATIC CAMERA DE LUXE AND
HAS ALL THE REFINEMENTS REQUIRED BY THE
MOST EXACTING WORKERS.



IT DRIVES 200 FT. 35 MM. FILM WITH ONE WIND OF
THE MECHANISM.

IT HAS FOCUSSING AND IRIS CONTROLS ARRANGED
TO WORK AT THE BACK OF THE CAMERA AND
THEY CAN BE USED WHILE THE INSTRUMENT IS
RUNNING.

IT CAN BE USED FOR "FADE IN" AND "FADE OUT"
EFFECTS.

THE "N.S." AUTO KINE' CAMERA

STUDIO MODEL—*continued.*

IT CAN BE USED FOR "MIXES."

IT HAS A "ONE TURN ONE PICTURE" HANDLE.

IT CAN BE RUN AT SPEEDS VARYING FROM 10 TO 24 FRAMES A SECOND.

IT HAS A LENS HOOD INTO WHICH LIGHT FILTERS CAN BE INSERTED AND QUICKLY CHANGED.

IT HAS A REFLEX FOCUSING DEVICE PERMITTING OF ACCURATE FOCUSING WHEN TAKING "CLOSE UPS" OR WHEN USING LONG FOCUS LENSES.

This model is in appearance and general construction very similar to our Regular model but embodies all the additions that have been fitted from time to time. The measurements of the camera body and boxes are the same as those of the Regular instrument, but the boxes differ in construction so that the film may be reversed in them.

Extra lenses and their fittings cost the same price as those listed for the Regular model, but the special focussing and iris controls from the back of the camera are not fitted to these extra lenses.

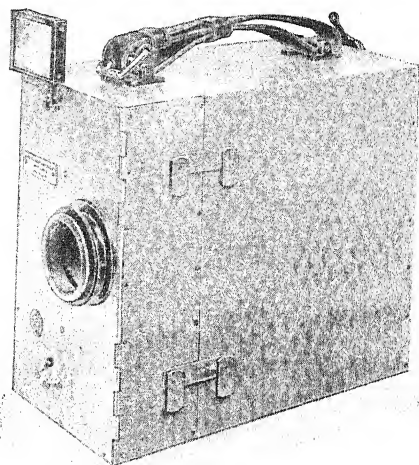
	Price.		Code
	£ s. d.		Word.
Price of Studio Model with F/1.9 Ross "Xpres" Lens	199 10 0		SPEKTRUM
Extra Film Boxes .. each	8 10 0		SPELATORE
Hand-sewn Solid Leather Case to hold camera as above ..	5 5 0		SPELAZZO
"N.S." Unipod (page 462) ..	1 15 0		STABILIFY
"N.S." Tripod Stand with Uni- versal control for Panoram and Tilting Top	55 0 0		SPELLFUL



AUTO KINE' CAMERA

SLOW MOTION MODEL

THE FIRST
AND ONLY
CLOCKWORK
DRIVEN
CAMERA
FOR
SLOW
MOTION
WORK



IT REQUIRES NO TRIPOD.
NO WINCH HANDLE.
NO FLEXIBLE DRIVE.
NO MOTOR.
NO ACCUMULATOR.
NO HARD WORK.

IT HAS VARIABLE SPEED 40 TO 120 FRAMES A SECOND.

IT RUNS 100 FEET WITH ONE WIND OF THE MECHANISM.

IT PASSES ONLY 18 INCHES FILM BEFORE FULL RATE IS OBTAINED.

IT CAN BE STOPPED AND RE-STARTED with a loss of only 2 feet of under speeded film.

THE "N.S." AUTO KINE' CAMERA

SLOW MOTION MODEL—*continued.*

In general appearance this camera is very similar to our Regular and Professional Models but somewhat smaller. It is only intended for the special work of analysing the sequence of motion. Pictures taken at a high rate of speed and shown at the normal rate have a great fascination for any observer quite apart from their scientific value in deciding what actually takes place in a movement that is not seen by the eye. Hitherto cameras for this work have been exceedingly heavy and very costly. Driving the mechanism is generally a toil, and a great quantity of film is wasted before the instruments attain their normal speed. In the "N.S." Camera the difficulties hitherto characteristic of this work have been surmounted. The camera is light and does not need a tripod. No laborious work is necessary. The mechanism is wound up and only requires a slight pressure on the camera release to set the film running at the rate decided upon, and there is no heavy loss of film when starting up.

Size, $10 \times 5 \times 8\frac{1}{2}$ in.

Weight, 19 lbs.

	Price.			Code
	£	s.	d.	Word.
"N.S." Auto Kine' Camera with 2 in. F/1.9 Ross "Xpres" Lens	170	0	0	SPERNES
Hand-sewn Solid Leather Case with lock and key and sling strap	4	15	0	SPERNIMUS
Extra Film Boxes for 100 ft. 35 mm. film	8	10	0	SPERNETIS
"N.S." Unipod (see page 462) ..	1	15	0	STABILIFY
"N.S." Kine' Tripod with Uni- versal control to Panoram and Tilting Top	55	0	0	SPELLFUL

LONDON

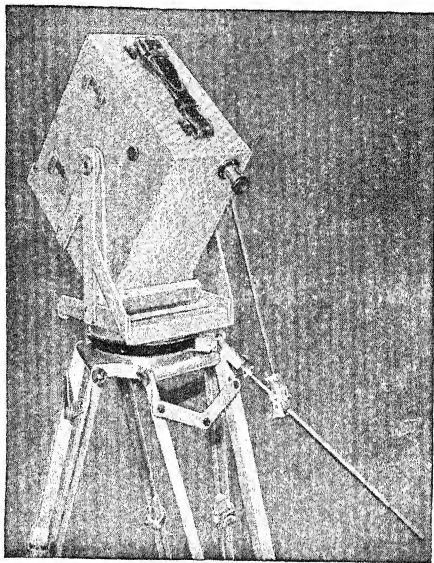


KINE' TRIPOD

IS
THE BEST
IN THE
WORLD.

IT
COMBINES
LIGHTNESS
AND
RIGIDITY.

MARVELLOUS
RANGE
OF
MOVEMENT



This stand is made entirely of metal, and although weighing only 19 lbs. is the strongest and steadiest stand yet produced. It has a novel elevating head which allows the camera to completely revolve vertically, so that it can be used pointing directly upwards, or the camera may be inverted for trick work. The panoram head works quite smoothly, has no clockwork mechanism or lubricated washers and can be moved at any speed by a lever which also controls the vertical movement. With one hand on this lever the camera can be elevated or depressed to 45 deg. from the horizontal at the same time that it is being panoramed. By detaching a joint from the legs the vertical and horizontal movements can be operated separately, and the camera may then be used in a vertical position, or entirely reversed if desired.

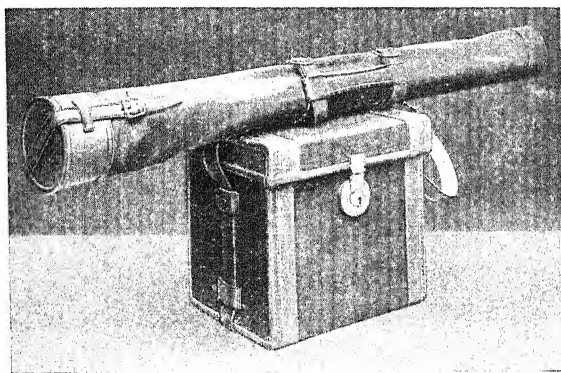
INGRAM
LONDON

"N.S." AUTO KINE' TRIPOD—*continued.*

The legs are quickly detachable for transport and can be fixed instantly.

The height can be altered with great facility, the legs sliding very freely, and the changing being easy and certain. A special fixing is provided for our Auto Camera which allows it to be affixed or detached in 5 seconds.

	Price. £ s. d.	Code Word.
The Stand complete with revolving and tilting top weighs 19½ lbs. and the price is	55 0 0	SPELLFUL
The Stand with revolving top only weighing 12 lbs. 10 ozs. costs	33 0 0	SPELFONT'



For transit we recommend our Mail Canvas Cases. These are strengthened with leather binding. Two cases are supplied, one holding the Tripod Legs and the other the Revolving and Tilting Tops. The weight of Tripod complete with the two cases is 26 lbs. (12 kilos).

	Price. £ s. d.	Code Word.
Price of the Two Cases	4 10 0	SPELLASSI

LONDON

SEND YOUR FILMS TO US for Developing, Printing, and Enlarging

At our Brixton Works, which are in ideal surroundings, we specialise in the best work. From our prices it will be seen that it probably costs less to place your orders in the hands of experts than to give them to a jobbing store that makes a D. & P. department simply a side line of another business.



Our Brixton Printing Works

Developing Roll Film Spools, 6 or 8 exposures, up to $5\frac{1}{2} \times 3\frac{1}{2}$... 6d.
All 10 or 12 Exposures, all sizes larger than $5\frac{1}{2} \times 3\frac{1}{2}$ and Stereo Films... 1 -
Panchromatic Films 50 per cent extra.

V.P. Kodak	No. 2	No. 2 Bull's	No. 3	Post-	10 x 15	1-plate
No. 1 Brownie	Brownie	Eye, No.	Kodak &	card	cm.	and
No. 1 Ensignette.	$3\frac{1}{2} \times 2\frac{1}{2}$	1A Kodak	$4\frac{1}{2} \times 3\frac{1}{2}$	5 x 4		7 x 5
Black and White						
Prints on Gaslight	2/-	2/-	2/6	2/6	3/6	4/-
paper, per doz.						4/6

Post Free for Cash with order.

Every kind of Printing and Enlarging is undertaken as well as Finishing and Framing, and we shall be pleased to quote for any requirement.

Lantern Slides a speciality. Warm or Black Tones, 20/- a dozen.

Send for Developing and Printing Price List.

about
OUR STOCK
covers the widest possible range of instruments for amateur and professional use, the best and latest of which are always to be seen *first* at any of our branches.

YOUR NEEDS
can be quickly fulfilled, and any advice is willingly given by a staff which is widely experienced in every phase of the photographic trade.

WHAT THEY SAY:

"I have now fitted up and tested enlarger. It is perfect, and this is the fourth time in four months that I have been perfectly satisfied in my dealings with you."

W.P.

"Camera to hand, safe and quite satisfactory. I thank you for the best value I have had as yet."

T.C.

Specialists in the Latest
GUARANTEED
Used Cameras and
Cine Apparatus by
every known maker

ALSO LONDON'S LARGEST STOCK
OF NEW CAMERAS, CINE
APPARATUS, GLASSES, ENLARGERS
MICROSCOPES
AND ALL ACCESSORIES

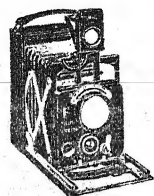
CITY SALE & EXCHANGE

(1929) LTD.

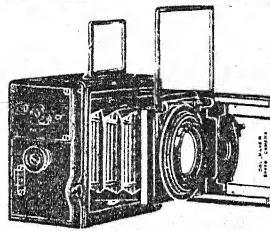
59, CHEAPSIDE, E.C.2 : 90/94, FLEET ST., E.C.4
54, LIME ST., E.C.3 : 84, ALDERGATE ST., E.C.
LONDON

THOUSANDS OF SATISFIED CUSTOMERS HAVE WRITTEN THEIR
THANKS ————— A FEW EXTRACTS ARE SHOWN ABOVE

CITY SALE & EXCHANGE (1929) Ltd



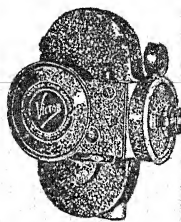
3 1/2 x 2 1/2 N. & G. New Special Sibyl, F/4.5 Ross Xpres, 3 slides, F.P.A. and case. New £25/10. Price £13/17/6



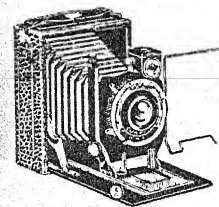
4 1/2 x 6 Dallmeyer Speed, 2.9 Pentac lens, self-capping focal plane shutter, 3 double slides. New £18/18/- Price £9 9 0



3 x 4 Pilot Reflex Roll Film, F/2.8 Zeiss Tessar, New £22/10/- Price £14 12 6



16 mm. Victor Cine Camera, 3.5 Dallmeyer lens and case. New £60. Price £15 15 0



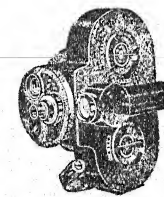
3 1/2 x 2 1/2 Salex de Luxe, F/3.8 lens, Compur shutter, 3 slides. New £6/17/6 Price £4 17 6



Pathoscope Moto Camera Lux, F/2.7 Zeiss Tessar and case. New £22. Price £13 17 6

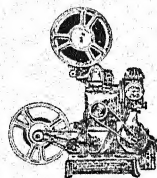


2 1/2 x 2 1/2 Automatic Rolleiflex, F/3.5 Zeiss Tessar and case. New £23/10/- Price £16/16

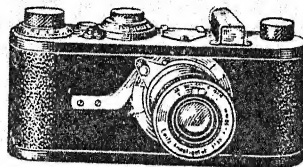


16 mm. Bell & Howell 70 DA, 1", 2" and 4" F/3.5 Dallmeyer lens and case. New £122. Price £87 10 0

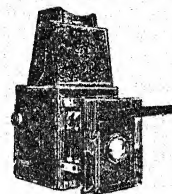
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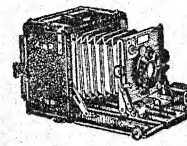
Leitz Leica, F/3.5 Elmar lens, range finder, 3 spool-holders and case. New £19/7/6, Price £9 9 0



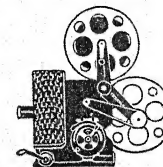
4-plate T.P. Junior Ruby Reflex, F/4.5 Cooke lens, 6 slides and case. New £14/14/- Price £8 7 6



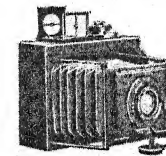
3 1/2 x 2 1/2 Zeiss Ikon Miraphot Auto-matic enlarger 6.3 Novar lens. New £7/12/6. Price £5 5 0



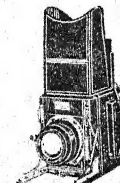
4-plate Sanderson Hand and Stand, F/6.8 anastigmat, 3 slides and case. New £16. Price £4 17 6



16 mm. Model C Kodascope Projector, complete with resistance. New £20/15/- Price £12 12 0

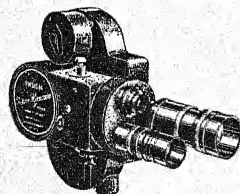


3 1/2 x 2 1/2 Zeiss Ikon Palinos Focal Plane, F/4.5 Tessar, 2 slides and F.P.A. New £29/10/- Price £11 11 0

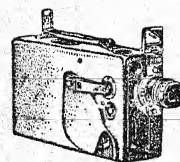


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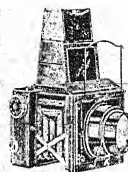
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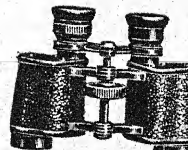
16 mm. Ensign Super Kinecam, 1", 2" and 4" F/3.5 Dallmeyer lenses. New £70 Price £47 15 0



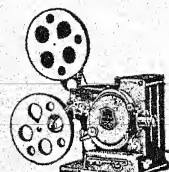
16 mm. Model K Cine Kodak, 1.9 lens and case. New £42/7/6. Price £28 10 0



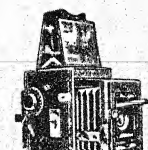
9 x 12 Zeiss Ikon Miroflex, F/2.7 Zeiss Tessar, 6 slides. New £70. Price £31 10 0



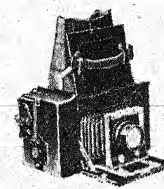
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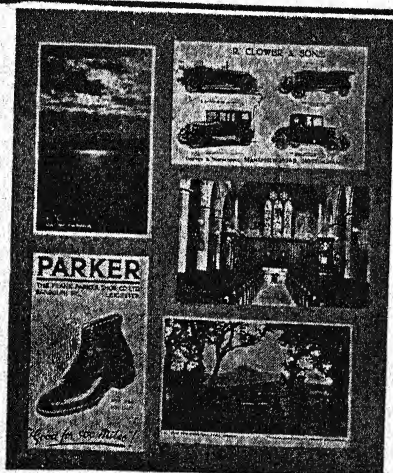
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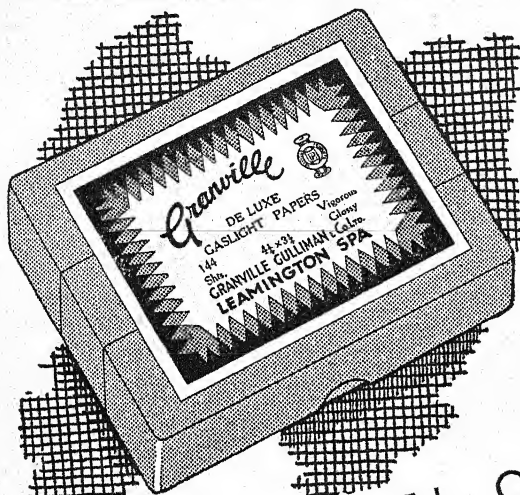
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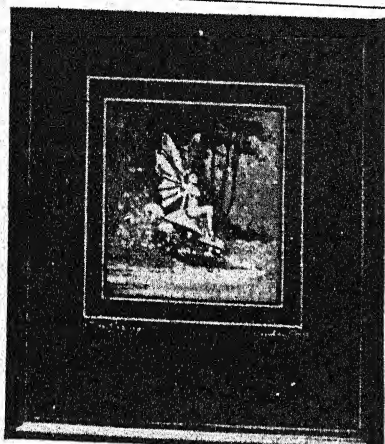
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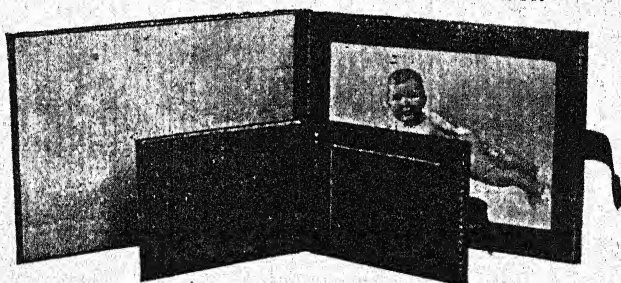


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3/181.—	No. 3 Folding Ensign; Plutar F/8; Shutter 1/25th to 1/100th, T. & B.; Focussing Screen; 3 S.M. Slides ... For	3	10	0
3/186.—	1-Plate Challenge; Beck Symmetrical F/8; Shutter 1 sec. to 1/100th, T. & B.; Focussing Scale for Plates and Film ... For	2	0	0
3/189.—	P.C. Kodak Roll Film; T. T. & H. Anastigmat F/6.8; Shutter 1 sec. to 1/100th, T. & B.; Focussing; Leather Case For	5	10	0
3/196.—	No. 3a Autographic Kodak Special; Ross F/6.3; Shutter 1 sec. to 1/200th, T. & B.; Focussing; Colour Filter; leather Case For	8	0	0
8/202.—	1-Plate Graflex Reflex; Tessar F/4.5; Shutter 1/10th to 1/1000th, T.; Revolving Back; D.D. Slide; F.P. Adapter; Leather Case For	24	0	0
5/207.—	3 $\frac{1}{2}$ x 2 $\frac{1}{2}$ Mentor Folding Reflex; Tessar F/4.5; Shutter 1/14th to 1/1300th; F.P. Adapter; 6 S.M. Slides; Cowhide Case For	8	0	0

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7/215.	—10 × 15 c/m. Mentor Folding Reflex; Tessar F/4.5; Shutter 1/8th to 1/1300th, T.; 3 D.D. Slides; Filter; Pigskin Case	For	14	0 0
7/216.	—1-Plate Adams Minex Reflex; Ross Combinable F/5.5; Shutter 1/8th to 1/1000th, T. & B.; 6 D.D. Slides; F.P. Adapter; Ross Telecentric F/6.8; Filters; Cases	For	50	0 0
8/220.	—1-Plate Popular Pressman Reflex; Ross Tessar F/4.5; Shutter 1/15th to 1/1000th, T.; Focussing; Reversible Back; Mackenzie Slide with 6 Envelopes; 3 Lens Filters in Morocco Case; Case for complete outfit	For	8	0 0
8/221.	—3½ × 2½ A.P.E.M. Reflex; Cooke-Apem F/4.5; Shutter 1/25th to 1/1000th, T.; Focussing Screen; 3 S.M. Slides; F.P. Adapter; Leather Case	For	7	5 0
8/226.	—3½ × 2½ N. & G. Folding Reflex; Zeiss Protar F/6.3; Shutter 1/10th to 1/800th, T. & B.; Focussing Screen; Revolving Back; 3 D.D. Slides; F.P. Adapter; Leather Case	For	30	0 0
8/228.	—3½ × 2½ N. & G. Folding Reflex; Xpres F/4.5; Shutter 1/10th to 1/800th, T. & B.; Revolving Back; Focussing Screen; 3 D.D. Slides; F.P. Adapter; Filter; Leather Case	For	34	0 0
8/229.	—P.C. "Soho" Reflex; Tessar F/4.5; Shutter 1/18th to 1/700th, T.; Focussing Screen; F.P. Adapter; Filter; Leather Case	For	12	0 0
6/232.	—P.C. "Soho" Reflex; Dogmar F/4.5; Shutter 1/18th to 1/700th, T.; Focussing Screen; 5 D.D. Slides; Leather Case	For	18	18 0
7/233.	—3½ × 2½ Dainty Soho Reflex; Aldis F/4.5; Shutter 1/18th to 1/800th, T.; Revolving Back; 6 D.D. Slides; F.P. Adapter; 6" Port-land F/4.5 Soft Focus Lens in Case; Cowhide Case	For	15	0 0
7/241.	—5 × 4 Marion "Soho" Reflex; Goerz Celor F/4.8; Shutter 1/14th to 1/800th; Focussing Screen; 6 D.D. Slides; F.P. Adapter; Cowhide Case	For	15	0 0
2/289.	—9 × 12 c/m. Ica Focal Plane Camera; Tessar F/4.5; Shutter 1/15th to 1/1000th, T.; Focussing Screen; 6 S.M. Slides; F.P. Adapter; Leather Case	For	15	0 0
2/290.	—3½ × 2½ Super Speed Deckrollo-Nettel Focal Plane Camera; Tessar F/4.5; Shutter 1/10th to 1/1200th, T.; Focussing Screen; 3 Slides; F.P. Adapter	For	9	0 0
2/292.	—3½ × 2½ Tropical Deckrollo-Nettel Focal Plane Camera; Tessar F/4.5; Shutter 1/10th to 1/1200th, T. & B.; Focussing Screen; 6 D.D. Slides; F.P. Adapter; Leather Case	For	15	0 0
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3/354.	—45 × 107 m/m. Voigtlander "Stereoflectoscope" Camera; 3 Heliar F/4.5 Lenses; F.P. Adapter; Shutter 1 sec. to 1/200th ...	For	18	0 0
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4/381.	—Zeiss Magnar Telephoto F/10 Lens; Flange, Cap and Velvet-lined Box...	For	4	0 0
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3/432.	—Dallmeyer Stigmatic 5.3" Focus F/6 Lens; Auto Shutter 1 sec. to 1/100th, T. & B.; Flange-adapter ...	For	3	10 0
3/450.	— $\frac{1}{2}$ -Plate Cooke F/6.5 Lens, complete with Flange ...	For	2	0 0
3/452.	—Aldis Anastigmat 5 $\frac{1}{4}$ " F/6 Lens; Compound Shutter 1 sec. to 1/200th, T. & B.; Flange; Cap; Aldis Trio X2 and Aldis Duo X4 Lenses; Ensign $\frac{1}{4}$ -Plate W. A. Lens-cells in case; Light Filter in Cell ...	For	3	10 0
3/470.	—Tessar 6 $\frac{1}{2}$ " F/6.3 Lens; Koilos Shutter 1 sec. to 1/300th, T. & B.; no Flange ...	For	3	5 0
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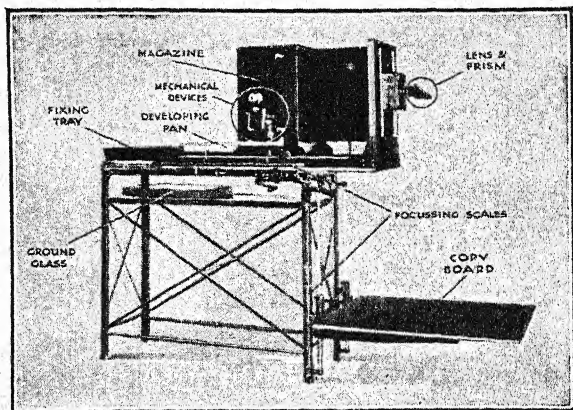
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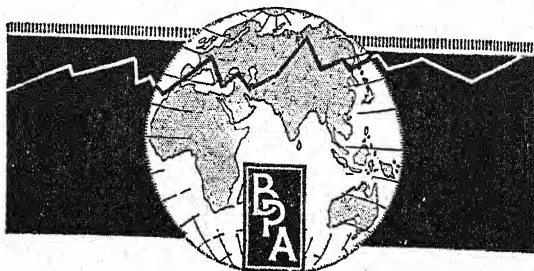
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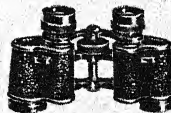
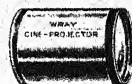
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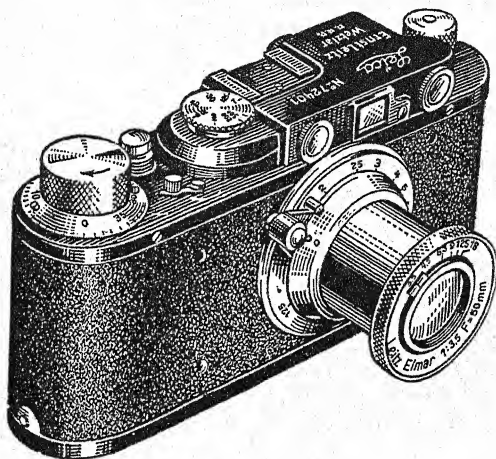
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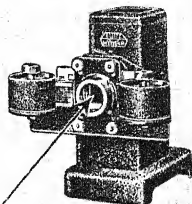
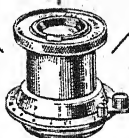
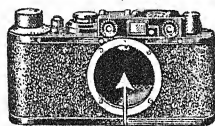
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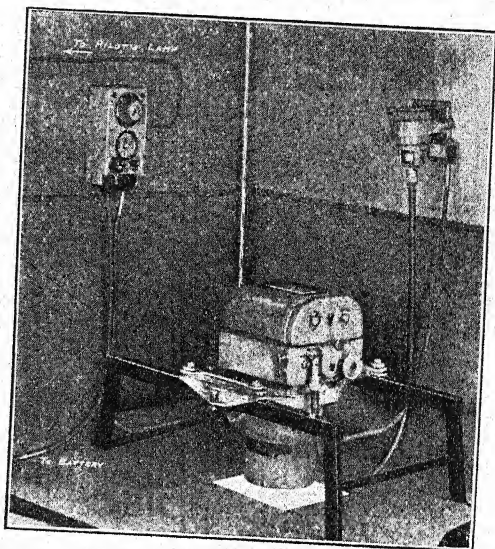
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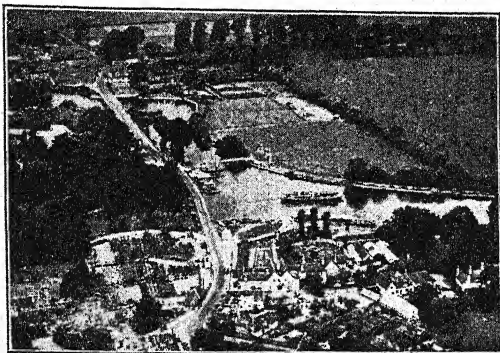
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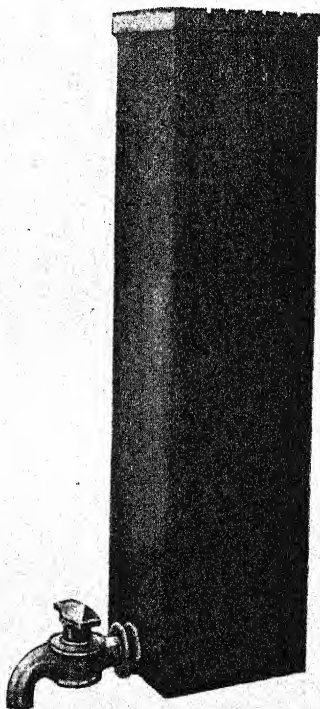
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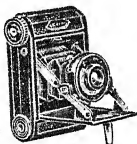
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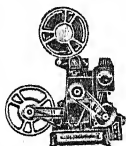
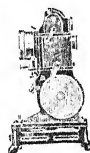
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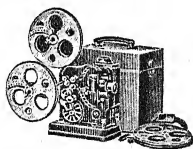
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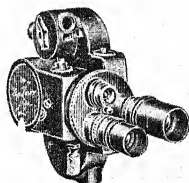
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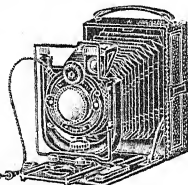
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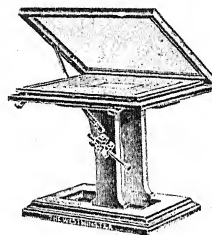
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No. E.3	" 10 " "
No. E.3a	" 12 " "

"Standard" Series Recommended in all cases where a large amount of work is being dealt with.

No. 1.	To make 5 gallons Normal Developer.
No. 2.	" 10 " or 5 gallons Quick Developer.
No. 2a.	" 12 " or 6 " " "
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No. 3a.	" 24 " or 12 " " "
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No. S.3a.	" 12 " " "
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No. S.5.	" 40 " " "
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GASLIGHT DEVELOPER—Johnson's Gaslight Developer has become very popular with D. and P. Departments; it is compounded to a formula that is carefully balanced to give good colour with the maximum latitude in development.

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No. G.5.	" 40 " " 80 " " "

ACID FIXING POWDER—Johnson's Acid Fixing Bath is strongly recommended for all D. and P. work, it is quick in action, not excessively acid, retains its working properties for a long time and produces clean bright prints and negatives. In airtight tins containing 5, 7, 10, and 14 lbs.

ILFORD TROPICAL HARDENER—Photographers, especially those in tropical countries, have found great benefit from the use of this Bath; it overcomes all the difficulties of frilling and softening of the film due to high temperatures, and enables films to be dried quickly by artificial heat. One pint makes 1 gallon.

JOHNSON'S ACID HARDENER—This is of very great value to all D. and P. Departments. It is very highly concentrated and is added to the plain Hypo Fixing Baths to enable quick drying and easy handling while giving brightness and clearness to the prints.



JOHNSON & SONS

MANUFACTURING CHEMISTS LTD
HENDON LONDON



JOHNSON'S CHEMICALS

For Process Engraving, etc.

The very high quality that is maintained in the whole list of JOHNSON'S "SCALES BRAND" CHEMICALS is of great importance to everyone connected with Photography, and especially to Photo Engravers who must depend very largely on Chemicals for efficiency in all stages of their work.

JOHNSON'S COLLODIONS—"NEGATIVE"—The manufacture of Negative Collodion is most exacting and the greatest care must be given to the standardisation of all the ingredients. Johnson's "Negative" Collodion is manufactured under the strictest supervision and only those who have practical knowledge of the function of Collodions are employed in its preparation. The equipment for the manufacture of Johnson's "Negative" Collodion is such that orders of any size can be executed immediately.

JOHNSON'S "NEGATIVE" COLLODION can be described as a "super" quality Tone Collodion.

"ENGRAVA"—This Collodion is somewhat lower in price than Johnson's Negative quality, but the "standard" which is maintained in its manufacture ensures satisfaction to the user. It produces a film that is transparent and free from any cloudiness, is tough without being horny, gives a perfectly good opaque dot formation.

"LINE"—Specially for the production of Line Negatives; it is clean working, quick in manipulation and gives very strong contrast. Great density is obtained with a very clean cut image, saving much time and work.

JOHNSON'S SILVER NITRATE—known throughout the World—It is the "standard" of purity and reliability and is sold under the guarantee of the "Scales Brand" Trade Mark.

BLOODIT—A synthetic Dragon's Blood. Process Engravers will recognise in Bloodit a product that will prove to be a great saver of time and worry. Being standardised in manufacture it overcomes the difficulty which has always been a source of annoyance to the Process Engraver, namely, the uncertainty and lack of uniformity in the natural Dragon's Blood. It is uniform and constant in working, it is cheaper than Dragon's Blood and more economical in use, and is used by some of the best known Process Houses.

Other Chemicals for Process Engravers supplied under the "Scales Brand" Trade Mark are as follows:—

Albumen.	Developers.	Potass. Bromide.
Ammon. Bichromate.	Gums.	Potass. Cyanide.
Beeswax.	Iron Perchloride.	Process Glue.
Bitumen.	Potass. Bichromate.	Varnishes, etc.

PHOTO COPYING DEVELOPER—This Developer is for the machines that are now in use for copying plans, documents, etc. It is packed in various sizes to make the quantities required by the machines in general use.

X-RAY DEVELOPER, JOHNSON'S—A perfectly well-balanced formula for all Radiographic Plates and Films. It is used in large quantities in Military and other Hospitals, and is made in various sizes from 80 ozs. to 3 gallons. X-RAY FIXING is also supplied in the same sizes.

JOHNSON'S VARNISHES—The series also includes Dry Plate, Matt, Crystal, Dammar, Retouching Medium, Spotting Medium, Dead Black.



JOHNSON & SONS

MANUFACTURING CHEMISTS LTD
HENDON  LONDON

JOHNSON'S CHEMICALS

For Amateur Photographers.

Developers, Tonings, Intensifiers, Fixing Baths, etc., of every formula are manufactured by JOHNSONS in Solutions, Cartridges, Packets and Tablets (Scaloids) for Amateur use.

SCALOIDS—This series of Developers, Tonings, etc., is of great convenience to amateur photographers who have limited dark-room accommodation, as a complete chemical equipment is obtainable that can be kept in a box or small drawer. Scaloids dissolve quickly and as they are packed in Glass Tubes retain their efficiency almost indefinitely.

Included in the Scaloid Series is **Vedol**, a developer equally suitable for films, plates, lantern slides, Bromide and Gaslight papers. Time and Temperature Tables are included with each packet.

AZOL—The Correct Developer. With every bottle of Azol there is enclosed complete instruction leaflet giving Time and Temperature Development Tables which show at a glance just how long the film or plate should be left in the Developer to be correctly developed. 3 ozs. makes from 75 to 300 ozs.

CARTRIDGE DEVELOPERS—The **AMIDOL CARTRIDGE** will be found to be of particular interest to all Bromide workers; each glass tube contains the complete Developer and the chemicals are preserved almost indefinitely. The same applies to the **METOL-QUINOL Gaslight Developer Cartridge**, which is also self-contained and is made to a formula that works excellently with every make of Gaslight Paper.

JOHNSON'S DESENSITIZER—Plates or Films immersed in a dilute solution of this for one to two minutes before development can then be developed in a bright yellow light or the shaded light of a candle. It is invaluable to the photographer who uses Panchromatic and other Colour Sensitive films or plates.

JOHNSON'S FLASHPOWDER is still the most suitable and reliable for indoor photography. Complete instructions and exposure Tables are enclosed with each packet, ensuring success for every camera user. No special apparatus is required when using Johnson's Flashpowder.

JOHNSON'S MOUNTANT—Johnson's Photographic Mountant has stood the test of over thirty years and is still the most popular Photographic Paste because it is absolutely free from acid or any chemical that causes deterioration of the print. Delicate photographic prints demand pure paste—**JOHNSON'S MOUNTANT**.

PHOTO TINTS and PASTELS—For the tinting of Lantern Slides, Bromide and Gaslight Prints, a complete range of tints is included in both Photo Tints and Pastels; work with either is simple and becomes very fascinating.

JOHNSON'S WHITE INK can be used with an ordinary pen for decorating mounts and albums, titling lantern slides and prints, and for generally adding a finished appearance to the work.

JOHNSON'S BLACK TITLING INK—A waterproof ink that can be applied by means of a pen or brush on films, plates and lantern slides.

Johnson's "Scales Brand" Chemicals and Photographic Preparations are stocked by the following Agents:—

AUSTRALIA and NEW ZEALAND:

HARRINGTON'S LTD., Sydney and Wellington.

SOUTH AFRICA:

ASHLEY & RADMORE, Capetown and Johannesburg.

INDIA:

HOUGHTON-BUTCHER (EASTERN) LTD., Bombay and Calcutta.

EGYPT:

W. A. LANCASTER, Alexandria and Cairo.

U.S.A.:

GEORGE MURPHY INC., 57 East 9th Street, New York.





Wallace Heaton LTD.

The Amateur Cine People

119 NEW BOND STREET, LONDON, W.1

Phone - Mayfair 0924-5-6.

'Grams: Zodelaria, Wesdo, London

and at 47 BERKELEY STREET, LONDON, W.1

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ABOUT OUR SERVICE

FOUNDED IN 1839. For close on a century we have been supplying discriminating photographers in every quarter of the globe, always with the latest photographic apparatus.

FOREIGN ORDERS.

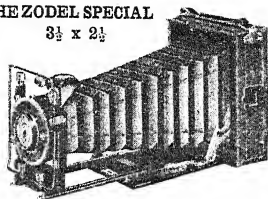
Customers abroad can rely on their orders being intelligently carried out by experienced salesmen possessing full knowledge of the conditions under which the goods will have to be used. Overseas orders for second-hand goods should always state an alternative choice. Although the size and selection of our stock is second to none in the country, the bargain prices at which our second-hand goods are offered, do not permit them to remain long in stock. Our prices are nett and if possible the full amount should be remitted with the order and so avoid delay. In any case, at least half should be remitted and the balance may be collected V.P.P. post or C.O.D. by our shipping agents.

EXCHANGES. Many customers have written telling us that our exchange quotations are more liberal than those offered them by other firms. We always allow the full market value even when the customer takes in exchange other second-hand goods.

SECOND-HAND GOODS. We have already referred to our well assorted stock. It is comprised largely of slightly used, up-to-date models taken in exchange for the very latest apparatus

THE ZODEL SPECIAL

3½ x 2½



The world's best value, f 3.8 lens, delayed action, compur shutter, double extension, three slides or film pack adapter.

Price £6 17 6. Roll film holder 15/-

THE CAMERA OF THE YEAR

sold to our West End clientele. Practically speaking, they are no different from new, but having been used, are marked down 30% to 70% below list prices. Cameras, lenses, cine apparatus, binoculars, enlargers, are all included in our stock.

APPROVAL TERMS.

Mail orders, new or second-hand, will be sent on five day's approval if necessary, in the U.K. only. Goods dispatched immediately on receipt of full cash deposit.

DEFERRED TERMS.

Any goods are supplied on extended terms in Great Britain, for the addition of 5/- (up to £5) and 5% of the value if over £5. Payments spread over nine months.

CATALOGUES. Sent post free on request. Separate catalogues are issued for new cameras, etc., home cine apparatus, second-hand bargain (still and cine) enlargers, film library, etc.

NEW GOODS are always obtainable first at Wallace Heaton's. Orders can be booked as soon as a new model (Camera or Cine Apparatus) is announced by a manufacturer, British, Continental or American. Separate catalogues of goods by every reputable maker can be had on request.

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CITY SALE & EXCHANGE (1929) LTD. (5 BRANCHES)

Wallace Heaton LTD.

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Contractors to H.M. Government

also at 47 BERKELEY

GUARANTEED

SECOND-HAND CAMERA BARGAINS

Customers are reminded that it is advisable, when ordering, to give an alternative choice to any specific item. Those shown below are representative of our stock and value. Assurance is given that any reasonable requirements can be satisfactorily dealt with by our expert mail order department.

1—**Graflex Reflex**, 1-plate long extension model, 7" Kodak anast. lens. All as new, focal plane shutter, D.D. slide, F.P.A. Cost £60 ... **£18 18 0**
2—**1-plate Soho Reflex**, revolving back, rising front, Tessar f 2.7 lens, focal plane shutter 1/10 to 1/800, 6 D. slides. Cost £42 ... **£19 19 0**

3—**3½ x 2½ Minimum Palmos Focal Plane Camera**, Tessar f 4.5 anast. lens, shutter speeds 1/15 to 1/50, 3 D. slides, F.P.A. and case. Cost £25 ... **£9 17 0**

4—**1-plate Special Ruby Reflex**, rising front, revolving back, Aldis-Butcher f 4.5 anast. lens, focal plane shutter 1/10 to 1/1000, 2 D. slides, F.P.A. Cost £15 ... **£7 7 0**

5—**3½ x 2½ Junr. Special T.P. Reflex**, rising front, revolving back, Cooke

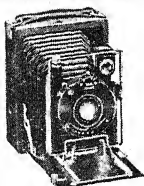
T.P. f 4.5 anast. lens, focal plane shutter, 5 slides, F.P.A. Cost £13 ... **£7 7 0**

6—**Postcard Soho Reflex**, horizontal model, rising and cross front, Dogmar f 6.5 anast. lens, focal plane shutter, 1/10 to 1/700, 6 slides, black case. Cost £30 ... **£16 18 0**

7—**3½ x 2½ Dallmeyer Speed Camera**, rising front, Radial focussing, Pentac f 2.9 lens, focal plane shutter, speeded 1/5 to 1/1000, case, F.P.A. Cost £32 ... **£18 18 0**

8—**3½ x 2½ Water Folding Plate Camera**, double extension, rising front, Zeiss Tessar f 4.5 anast. lens, new type Compur shutter, D.A., 1 sec to 1/250, wire frame and brilliant finder, 3 slides, roll holder. Cost £16/10/- ... **£12 12 0**

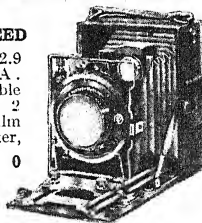
9—**3½ x 2½ Folding Cameo**, double extension, rising and cross front, f 4.5 anast. lens, Compur shutter, 1 sec. to 1/250 brilliant finder, case, 6 slides, roll holder. Cost £12 ... **£6 6 0**



ZODEL SPEED

camera f 2.9 lens, D.A. compur double extension, 2 slides or film pack adapter,

£15 15 0



ZODEL JUNIOR

camera for the amateur, f 6.3 lens, double extension, rising and cross front, 3 slides or film pack adapter. 3½ by 2½ **£2 17 6**
1pl. **£3 3 0**

10—**3½ x 2½ Zodel de Luxe Folding Plate Camera**, double extension, rising and cross front, f 4.5 Zodelar anast. lens, Compur shutter, 1 sec. to 1/250, 5 slides, F.P.A. Cost £9/9/- ... **£4 19 6**
11—**3½ x 2½ New Special Sibyl Folding Plate Camera**, rising and cross front, Cooke Aviar f 4.5 anast. lens, shutter speeded 1/5 sec. to 1/150,

case, F.P.A. Cost £24.

£13 13 0

12—**Ensign Focal Plane Roll Film Reflex**, 3½ x 2½, Aldis-Butcher f 4.5 anast. lens, shutter speeds 1/25 to 1/500, also f 6.5 Dallmeyer Tele lens, 9" focus, tan case. Cost £18/10/- **£10 10 0**

13—**Voigtlander Tourist Postcard All metal Folding Camera**, Heliar f 4.5 lens, 7" focus, also Tele Dynar lens f 6.3, 12½" focus, As new, case, 6 slides, F.P.A. Cost £37 ... **£15 15 0**

14—**3½ x 2½ Graflex Reflex** revolving back, Series B. Kodak Ross anast. lens f 4.5, focal plane shutter, 1/10 to 1/1000, F.P.A. Cost £22/10/- **£12 12 0**

15—**3½ x 2½ Makina Pocket Camera**, Anticom f 2.9 lens, 1 sec. to 1/200 Compur shutter, direct frame finder, long extension focus, 4 slides, F.P.A. Cost £28/- **£14 14 0**

16—**10 x 8 Double Extension Field Camera**, case, tripod, 3 D. slides. Cost £10 ... **£2 19 6**

17—**1-plate T.P. Field Camera**, double extension, rising front, reversing back, f 5.6 Wray lens, roller blind shutter, tripod, 6 slides. Cost £10/10/- **£2 19 6**

18—**1-plate Sanderson Hand and Stand Camera**, triple extension, rising and swing front, reversing back, Ensign f 6.8 anast. lens, speeded shutter 1 sec. to 1/150, also 9" f 9 Bis-Telar lens, case, 2 D. slides, F.P.A. Cost £20 ... **£6 6 0**

19—**1-plate Triple Extension Sanderson Hand and Stand Camera**, reversing back, f 6.3 Aldis lens, R.B. shutter, case, 5 slides. Cost £20 **£7 7 0**

20—**1-plate Field Camera**, double extension, rising and swing front, reversing back, Beck Neostigmat f 6 lens, Acme shutter, 1 sec. to 1/300, case, 2 slides. Cost £11/11/- ... **£4 17 6**

If you use any Cine Camera—You need our service!

Wallace Heaton

119 NEW BOND STREET, LONDON, W.1

STREET, LONDON, W.1

Wholesale and Retail Photo Finishers

OPINIONS THAT COUNT . . .

Dear Sir,

... The Zodel de Luxe Camera which I bought from you about 12 months ago is a wonderful little instrument, which has fully lived up to the reputation given it.

C.J.N.

Hounslow, Middlesex.

Lower Bebington,
Cheshire.
15/8/32.

Dear Sir,

I left on holiday immediately on receipt of camera. I have been in the Rhine Valley and have taken 25 pictures successfully out of 26.

I must say I am very satisfied with it and my guarantee appears to be unnecessary.

F.R.B.

Burton-on-Trent,
Staffs.
16/3/32,

Dear Sir,

The enlarger arrived quite safely on Friday last, and I tried it last night. I should like to know that I am highly satisfied with all the apparatus, and should like to thank you for generous allowances you made me. Needless to say, if I require any further apparatus, the order will be yours.

C.R.

The "Kolibri" Roll Film Camera arrived safely, and from appearances, it is a perfect little instrument. Both my friend (for whom I bought it) and myself are very pleased with the same, and thank you for prompt delivery of an instrument exactly as described.

Yours faithfully,—J.F.S.

Newbury, Berkshire. 19/4/32.

Dear Sir,

... As I shall be sailing for Queensland on 30th of this month . . . and I should like to thank you for the good business manner in which all my dealings with you have been carried out, and I shall certainly reopen an account with you on my return.—Yours faithfully,

(Signed) T.P.H.

Dear Sirs,

I thank you very much for the enlargement which I received to-day.

Real good, and I am ever so pleased with same. more orders in the near future.

Lagos, Nigeria,
West Africa.

Yours faithfully,
(Signed) H.A.

Schloss Königseggwald,
Warttemberg,
Germany.

Dear Sirs,

Your work is of an unusually high standard and I have never been anything but pleased with any work you have done for me. I only wish I could always send it to you.

Yours faithfully,
(Signed) W.A.O.

Sarawak Oilfields, Ltd.,
Miri, Sarawak,
Borneo.

Dear Sirs,

The new "Bolex" Model "D" projector and accessories arrived safely per yesterday's mail. After uncasing it stood on my table just as though it had been handed across from your showroom counter; good class show for us.

C.R.S.

Salford, Lancs.

17/9/32.

Dear Sirs,

The Salex Folding Camera I purchased from you has arrived safely. The camera quite exceeded my expectations. I am very grateful to you for the speed of the delivery and the excellent way in which it was packed. I will favour you with all my future requirements.

L.T.

Macclesfield.

Dear Sirs,

Although I quite realise the disadvantage of being so far away as regards the picking up of bargains, one never expects to receive such generous treatment, as I have received from you.

V.L.

ZODEL de LUXE
all metal double
extension, D.A.
compur, rising
and cross front.
3 slides, or F.P.A
f 4.5 lens.
£5 8 0
f 3.8 £9 9 0

**ROLL FILM
ZODEL**, f4.5 lens,
delaved compur,
double extension
3½ x 2½ only.
Price £10 10 0
**ZODEL MEANS
BETTER VALUE**

Exchange Your Camera—we sell all the Best Makes!



Wallace Heaton LTD.

The Amateur Cine People

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AND AT 47 BERKELEY STREET, LONDON W.1

IN ADDITION TO SELLING CAMERAS, LENSES, ENLARGERS, ETC.

We have various departments specialising in all photographic allied technical work.

D. & P. Our works are devoted to the scientific developing of plates, films, etc., of all kinds and may be relied on to handle panchromatic materials with absolute safety. An efficient fixing and washing service ensures absolute permanence of results. Our Printing, which is done on Velox, ensures the best results from all negatives. Unless instructed to the contrary prints are made with highly glazed surfaces ensuring utmost detail.

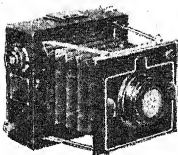
ENLARGING is entrusted only to highly skilled craftsmen, and we undertake any special work of toning, carbon or bromide enlargements on any desired surface.

LEICA FILMS, etc. A special department is devoted entirely to the handling of Leica, Contax and other miniature films which invariably require special treatment to preserve the fine grain and the necessary perfect quality. These films are enlarged also with special apparatus with a view to obtaining the maximum possible definition.

LANTERN SLIDES by contact or reduction in black or warm tones, from negatives or prints. Our service also provides for copying old and faded photographs and working up so that good prints may be obtained, or, in the case of portraits, reproductions in either watercolours or as pencil sketches.

COMMERCIAL PHOTOGRAPHY. In addition, there is a department devoted entirely to com-

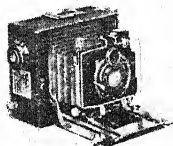
mercial photography for advertisers, fashions, etc. A new feature is the taking of aerial photographs, invaluable for surveyors, estate agents, town planning schemes, factory sites, manufacturers, etc. Our commercial photography department can also undertake the preparation and layout of advertisements, booklets, brochures, etc., and blockmaking and printing at prices lower than usual.



ZODELSPORT
Focal Plane
shutter 1/10th
to 1/1000th. 9
x 12 cm. for
3-plates f 4.5
anastigmat
lens with 3
slides. Price
£12 12 0

ZODEL UNIVERSAL

f4.5 lens, double
extension,
D.A. compur
and focal plane
shutters, 3 1/2 x
2 1/2 £17 17 0
9 x 12,
£19 19 0



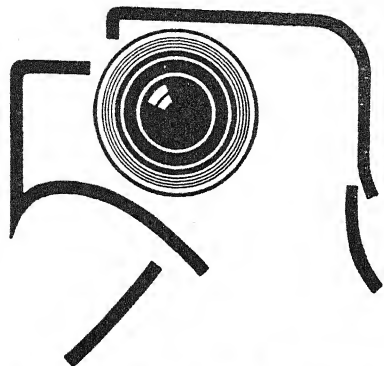
FILM EDITING. We have a cine film editing service in 9, 16 and 35 mm. widths and we can undertake all forms of titling, trick tiling, "fades" and "mixes" and well-equipped workshops can cope with lens mounting, filter mounting and repairs on all classes of photographic apparatus whether of British or Foreign manufacture, at the lowest possible prices, consistent with first rate quality.

Quotations gratis for any special work of this nature.

OUR STOCK ROOMS hold fresh supplies of modern brands of plates, films, papers, etc., all can be supplied in tropical packing, if specially required, at makers own prices.

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Tessars F/4.5, F/3.5, F/6.3,

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Double Protars F/6.3 to F/7.7 and Protar Sets (the single components may be used as long focus objectives at full aperture).

Dagor F/6.8 (back lens may be used stopped down as a long focus lens).

SPECIAL OBJECTIVES

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Biotar F/1.4, ultra-rapid objective

Tessar F/2.7,

Tessars F/3.5 of short focus,

Tele Tessar F/6.3, special objective of long focus,

Kino Tele Tessar F/4 rapid telephoto objective.

FOR PORTRAITURE

Tessar F/4.5

Tessar F/3.5

Tessar F/6.3

} in the longer foci

Tessar F/5, $f=50$ cm. and $f=70$ cm.

Triplets F/4.8, $f=50$ cm. and F/5, $f=70$ cm.

Tele Tessar F/6.3.

FOR SPECIALLY RAPID ACTION WORK

with Press and reflex cameras

with focal plane shutters.

Biotessar F/2.8.

FOR WIDE ANGLE WORK

Dagor F/9,

Protar F/18,

Hypergon F/22

FOR AERIAL PHOTOGRAPHY

Tessar F/4.5,

Tessar F/5, $f=50$ and $f=70$ cm.,

Triplets F/4.8, $f=50$ cm. and F/5, $f=70$ cm.



SURVEY OF ZEISS OBJECTIVES AND ACCESSORIES
WITH THEIR PRINCIPAL APPLICATIONS—Contd.

FOR TELEPHOTOGRAPHY and
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Tele Tessar F/6.3,

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Composite Tele Objectives, particularly for specially long distance work.

FOR PHOTOGRAPHY WITH SPECIALLY SHORT WAVE
ULTRAVIOLET LIGHT, ABOVE ALL FOR CRIMINOLOGICAL
AND SCIENTIFIC WORK,

Quartz Anastigmat F/4.5.

OPTICAL ACCESSORIES for
photographic objectives.

DISTARS and PROXARS:

attachment lenses for lengthening and shortening the focus.

YELLOW GLASS SCREENS:

filters for neutralising the difference of colour perception
between the eye and the Orthochromatic plate.

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filters for colour photography with Autochrome and Agfa
screen plates with lens effect for neutralising the effect of the
plate thickness.

Optical Equipment for PROCESS WORK

Apo Planar,

Apo Tessar,

with reversing prisms and mirrors,
revolving collars,
filter cells,

R-yellow filters and R-colour filters.

Focusing Microscope and Focusing Magnifier.



ZEISS F/2.8 TESSAR

Focal lengths 5 and 6 cm. for Small Cameras

A NEW F/2.8 Tessar which comes under the new Tessar patents granted a few years ago. Angular field over 50° at full aperture. Definition brilliant and uniform as with all Zeiss Tessars.

Both lenses can be fitted into the smallest size Compur Shutter C 24 without loss of aperture and their design enables them to be fitted to any small size camera which takes an F/3.5 Tessar, of the same focal length, in Compur shutter.

ZEISS BIOTESSAR F/2.8

A NEW objective of great rapidity, for focal plane and reflex cameras. The standard of definition of this objective over its whole field of 40° is exceedingly high, being fully equal, at these apertures, to that of the F/3.5 and F/4.5 TESSARS. Made in two focal lengths.

13.5 cm. focus covering $3\frac{1}{2} \times 2\frac{1}{2}$

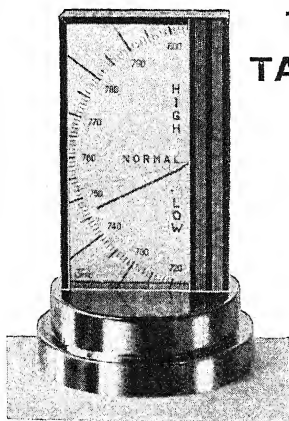
16.5 cm. " " $4\frac{1}{4} \times 3\frac{1}{2}$

ZEISS BIOTAR F/1.4

CINEMA ANASTIGMAT

Definitely superior at any aperture to any other lens used at the same aperture.

Angular field about 42° . The 4, 5 and 7 cm. lenses amply cover standard film and the 2 and 2.5 cm. lenses narrow film (12.8 mm. diagonal).



THE NEW ZEISS TABLE BAROMETER

Reliable, extremely modern in its simplicity, and an attractive addition to desk or table, office or home, this instrument strikes a new note in barometers. It is highly finished in chromium plate, $6\frac{1}{4}$ " in height over all, the dial alone 5" high by 3" wide. The usual setting pointer is provided, together with a simple adjustment for correcting the instrument for local altitude.

The Universal Camera of to-day and to-morrow

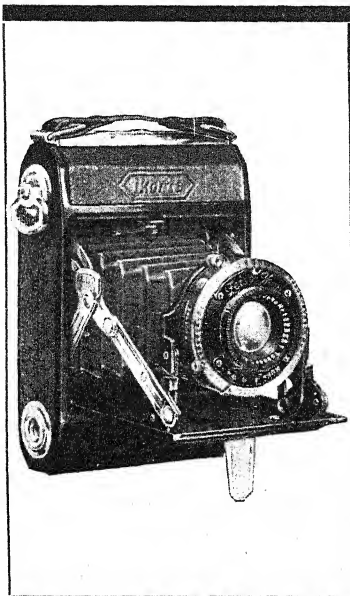
The Contax represents the latest Zeiss Ikon achievement in first-class precision cameras. It possesses the following especial advantages which place it in a class of its own:

- (1) All metal construction, even metal focal plane shutter 1/25th to 1/1000th second and Time
- (2) Minutely accurate range finder 4" basis; automatic focussing.
- (3) Automatic film transport by which double exposures are avoided.
- (4) Loading is as easy as with ordinary roll film camera.
- (5) Any film on the market for pictures 24×36 mm. (1½×15/16") can be used, but the
- (6) Contax spools are specially recommended. They do not require rewinding.
- (7) Wide range of Zeiss lenses; focal lengths from 1-3/16" to 7". Apertures F/6.3 to F/1.5.

Price with ZEISS TESSAR F/3.5 £24 10 0 With ZEISS TESSAR F/2.8 £27 0 0

ZEISS IKON LTD

MORTIMER HOUSE, 37/41 MORTIMER ST., LONDON, W.1



NEW IKONTA

For 16 roll film pictures each $2\frac{1}{4} \times 1\frac{1}{8}$ " on the usual $3\frac{1}{4} \times 2\frac{1}{4}$ " spool.

This Ikonta is the latest addition to the existing models. The size of the picture $2\frac{1}{4} \times 1\frac{1}{8}$ " (or $4\frac{1}{2} \times 6$ cm.), is really better proportioned than the so-called usual vest pocket size, $2\frac{1}{2} \times 1\frac{3}{8}$ " (or $4 \times 6\frac{1}{2}$ cm.), whilst from the economic standpoint the cost of negative material is reduced by 50 per cent. (16 pictures instead of 8 for 1/-).

The new Ikonta has all the features of the other sizes, viz., self-erecting front, compact design, and the beautiful finish associated with all instruments bearing the name of Zeiss.

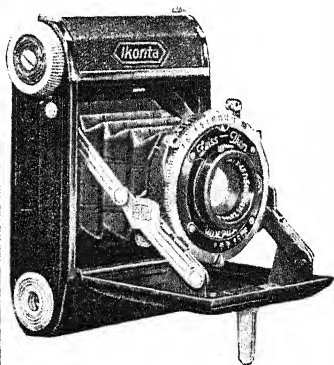
With Zeiss Ikon Novar F/6.3 and Dervall three-speed shutter ..	£	s.	d.
	4	10	0
With Zeiss Ikon Novar F/4.5 and Telma delayed action release shutter	6	0	0
With Zeiss Tessar F/4.5 and Compur shutter	10	5	0
With Zeiss Tessar F/3.5 and Compur shutter	12	5	0

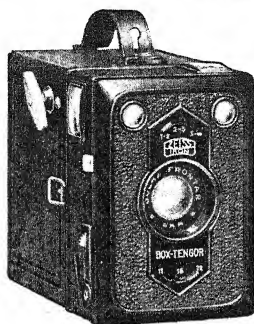
BABY IKONTA

No. 520/18

The Baby Ikonta is the smallest and daintiest practical camera. While a midget in size, the pictures are large enough to make delightful souvenirs of happy holidays, and enlargements up to 7×5 ", or even larger, can be made. The size of each picture is $1\frac{5}{8} \times 1\frac{1}{4}$ " and sixteen pictures are taken on each spool, at a cost of 1/- only. The camera measures only $3\frac{1}{8} \times 2\frac{3}{8} \times 1\frac{1}{2}$ "—not much larger than a cigarette case.

	£	s.	d.
With Novar anastigmat F/6.3 ..	3	7	6
With Novar anastigmat F/4.5 and Dervall shutter	4	0	0
With Novar F/4.5 and delayed action Telma shutter	4	17	6
With Zeiss Tessar F/4.5 and Compur shutter	8	17	6
With Novar F/3.5 and Compur shutter	7	10	0
With Zeiss Tessar F/3.5 and Compur shutter	10	17	6





BOX TENGOR

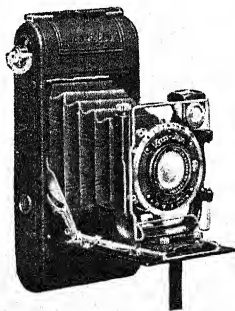
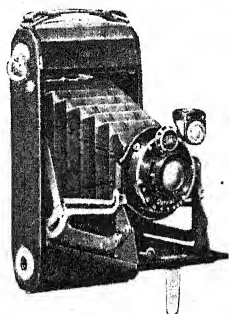
The Box Tengor is the aristocrat of box roll film cameras. An ideal instrument for amateurs wanting a really good camera at a low price. Special attention is drawn to the new No. 54, which takes 16 pictures $2\frac{1}{2} \times 1\frac{1}{4}$ " on the usual $3\frac{1}{2} \times 2\frac{1}{2}$ " spool.

Baby Box Tengor with Goerz Frontar F/11, for 16 pictures $1\frac{3}{4} \times 1\frac{1}{4}$ " on V.P. spool ..	£	s.	d.
Ditto, with Zeiss Ikon Novar Anastigmat F/6.3 ..	1	1	0
Box Tengor No. 54 with Goerz Frontar F/11, for 16 pictures $2\frac{1}{2} \times 1\frac{1}{4}$ " on the usual $3\frac{1}{2} \times 2\frac{1}{2}$ " spool ..	2	7	6
Box Tengor No. 54/2 with Goerz Frontar F/11, for $3\frac{1}{2} \times 2\frac{1}{2}$ " pictures ..	1	2	6
Box Tengor No. 54/2 with Goerz Frontar F/11, for $3\frac{1}{2} \times 2\frac{1}{2}$ " pictures ..	1	5	0

IKONTA

The World's best self-erecting high-class camera at moderate prices. The Ikonta takes any standard make roll film—although Zeiss Ikon film, on account of its fine grain and speed is specially to be recommended.

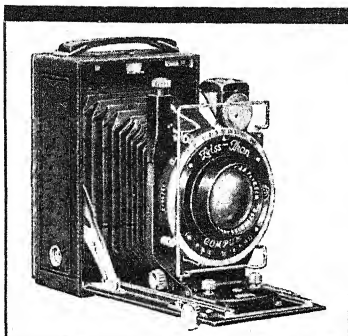
For $3\frac{1}{2} \times 2\frac{1}{2}$ " Pictures	£	s.	d.
With Novar F/6.3 in Dervall shutter ..	4	4	0
With Novar F/4.5 and delayed action release Telma shutter ..	6	5	0
With Zeiss Tessar F/4.5 and delayed action release Compur shutter ..	11	0	0
For $4\frac{1}{2} \times 2\frac{1}{2}$ " Pictures			
With Novar F/6.3 and Dervall shutter ..	5	2	6
With Zeiss Tessar F/4.5 and delayed action release Compur shutter ..	12	10	0



ICARETTES

Exquisitely designed precision cameras made in the following sizes, to take roll films $2\frac{1}{2} \times 1\frac{3}{8}$ ", $3\frac{1}{4} \times 2\frac{1}{4}$ " and $4\frac{1}{4} \times 2\frac{1}{4}$ ". The $3\frac{1}{4} \times 2\frac{1}{4}$ " size is also made in a double extension model. The Lloyd and the Nixe are similarly constructed models. All models are fitted with Zeiss Tessar F/4.5 and Compur shutter.

500/12 for V.P. ($2\frac{1}{2} \times 1\frac{3}{8}$ ") ..	£	s.	d.
500/2 for $3\frac{1}{4} \times 2\frac{1}{4}$ " roll film ..	11	11	0
551/2 for $3\frac{1}{4} \times 2\frac{1}{4}$ " pictures, double extension ..	13	5	0
500/15 for $4\frac{1}{4} \times 2\frac{1}{4}$ " roll film ..	16	12	6
510/17 (LLOYD), single extension, $4\frac{1}{4} \times 3\frac{1}{4}$ " ..	14	10	0
551/17 (NIXE), double extension, $4\frac{1}{4} \times 3\frac{1}{4}$ " ..	16	15	0
551/6 Ditto do. $5\frac{1}{2} \times 3\frac{1}{4}$ " ..	19	7	6
	21	12	6



TRONA No. 214

This model, fitted with universal Tessar, gives, in very compact form, a precision instrument suited for almost any purpose. It is equipped with double extension, rising front, two view finders, Zeiss Tessar F/3.5 and Compur shutter, with delayed action release.

Price, for $3\frac{1}{2}'' \times 2\frac{3}{4}''$ pictures, including 3 slides .. £ s. d.
.. 18 12 6

Film pack adapter, 9/6 extra.

A similar model for 9×12 cm.
or $\frac{1}{2}$ -plate pictures costs .. 22 12 6

Film pack adapter, 11/3 extra



MIROFLEX

A combined reflex and focal plane camera for general reflex and sports photography. The mirror is spring raised. The focal plane shutter has one-knob control only, and automatic speeds from $1/3$ rd to $1/2,000$ th second, as well as Time, can be obtained. A perfect focal plane and reflex camera of the highest class precision workmanship in one instrument.

Price with Zeiss Tessar F/4.5, £ s. d.
for $3\frac{1}{2}'' \times 2\frac{3}{4}''$ pictures 43 7 6
Ditto for 9×12 cm. or $4\frac{1}{4}'' \times 3\frac{3}{4}''$ pictures 47 10 0

Prices quoted above include 6 single slides.
Film pack adapter, $3\frac{1}{2}'' \times 2\frac{3}{4}''$, 9/6; 9×12 cm.
(or $4\frac{1}{4}'' \times 3\frac{3}{4}''$), 11/3

Also fitted with Zeiss Tessar F/3.5 and Zeiss Biotessar F/2.8. Prices on application.

ZEISS IKON FILM

The world-wide reputation enjoyed by Zeiss Ikon products applies not only to cameras. You will find equal quality in Zeiss Ikon films. Zeiss Ikon Film is supplied in all popular sizes, in both roll films and film packs, and in two grades—Standard Speed and Ortho Ultra Rapid Anti-Halo. The latter can be described as the universal film, as it can be used for instantaneous exposures in all kinds of weather. It has the phenomenal speed of 1200 H. & D.

This inset can give only brief particulars of a few Zeiss Ikon cameras. Full lists, descriptive of Zeiss Ikon cameras, enlargers, films, Episcopes, Epidiascopes, Home Cine apparatus, etc., will be forwarded free on request. The prices quoted are those current at the time of going to press, but are subject to alteration without notice.



USE
THE
NEW

P.S.P.

SUPER
SPEED
PANCHROMATIC

FILM

THE FASTEST OF
ALL AMATEUR CINE FILMS

Pathescope Super Speed Panchro-
matic 9.5 mm. Film.

P.S.P.—dressed in a rainbow carton as distinctive
as the picture it provides.

Ten times faster in artificial light and four
times more sensitive in daylight than our
Orthochromatic film. P.S.P. for filming
both earlier and later in the day, in
dull and rainy weather, in well-lighted
interiors in daylight, and after sun-
down in the home. For use with
all Motocameras

Sold in chargers only—no reloads
—and including the cost of
processing, but not charger,
6/- per 30 ft. reel

PATHESCOPE

9.5mm.

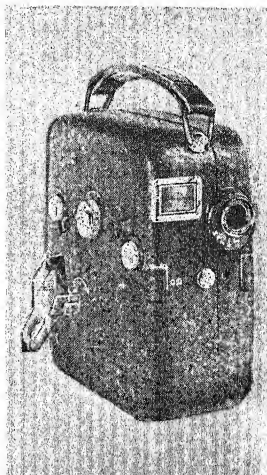
HOME MOVIES

THE MOTOCAMERA "B"

Fitted with a high-class $f 3.5$ anastigmat lens giving good—consistently good—results under the most varied conditions. In size, weight and appearance it is ideal. Like all other Motocameras, it can be loaded in daylight. One winding is sufficient to drive the motor a complete length of film—there are no clamps and take-up reels to detract from speed in loading, and the "gate" of the camera is easily accessible to facilitate easy and correct loading.

The Motocamera "B" takes the same charges as those used by the "Luxe" Models. Each 30ft. film, which provides for more than 1,000 single pictures, costs but 2/7 for ordinary stock and 2/- for development, or 6/- (including cost of processing) for Super Speed Panchromatic stock.

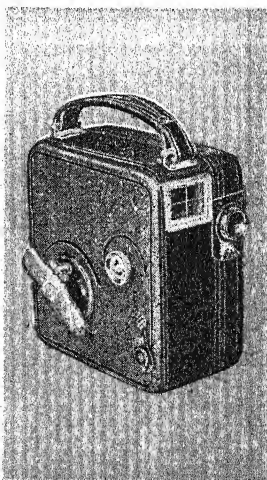
6GNS

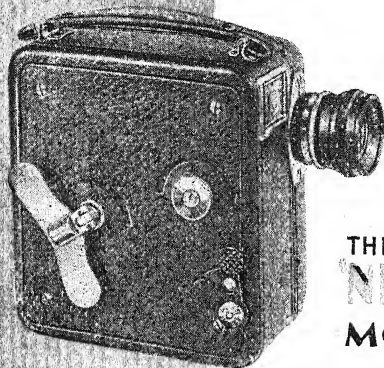


THE "DE LUXE" MOTOCAMERA

Leather covered, and distinctive both in finish and performance. Compactness and light weight are other considerations which make this unrivalled as a "movie" camera. As with all Motocameras, there is not a simpler way of filming; it is so simple and running costs are remarkably low. Fitted with a high class $f 3.5$ anastigmat lens, fully corrected. Using the standard 9.5 mm. film, the whole arrangement, simple, yet wonderfully efficient, of this picture-maker, ensures the utmost quality it is possible to secure in amateur films.

10GNS





THE NEW DE LUXE MOTOCAMERA

With "Hermagis" f 2.5 Lens
and Tele-Attachment

This new and wonderful double purpose cine camera provides two lenses for the price of one. When fully open the light admitted by the f 2.5 lens is twice as great as that of the standard model with f 3.5 lens. By the addition of the Tele-Attachment—another high-grade lens which screws right home to the front of the existing f 2.5 lens—the image on the film is enlarged four times; long distance cinematography with this most compact and efficient of all amateur cine cameras is now possible.

With f 2.5 "Hermagis" lens
only - - - £16. 16. 0

Tele-Attachment separate
£3. 3. 0

With f 2.5 "Hermagis" lens and
Tele-Attachment complete
£18. 18. 0

18 GNS

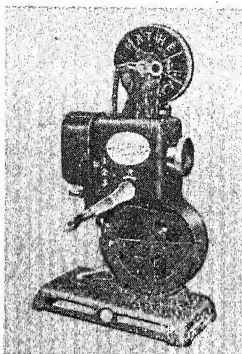
There are several "Motocameras," all equally efficient, and, whilst some models give greater scope than others, the results obtainable with each undoubtedly show that of all cine cameras, they are the best for securing outstanding and pleasing moving pictures, at the lowest possible price. The model you choose will be dependent upon the part it has to play in your hours of filming, which will give so much pleasure to yourself and others. All Motocameras use the most economical of films

9.5 mm.

PATHESCOPE HOME MOVIES

PATHÉSCOPE PROJECTORS

THE KID 55/-



Though sold at a very low price, this projector is made with the precision of a scientific instrument. Due to its construction and the special arrangement of the high quality lens and condenser, brilliantly illuminated, steady and correctly centred pictures are obtained. This machine is sold complete with a resistance for use on any house current up to 250 volts, or with batteries when other electricity is not available. All Pathéscope 30ft. and 60ft. films can be shown on the "Kid" Projector, as well as your own films taken with your Motocamera.

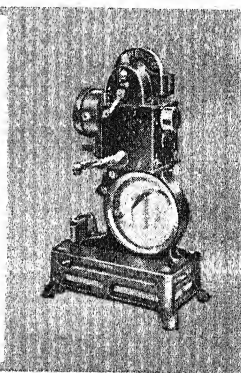
Super Attachment for "Kid" - - - 17/6

THE £6.15.0 HOME MOVIE

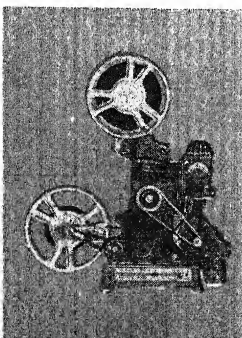
Embodying all the principles of the big motion-picture projectors, yet neat, compact and exceptionally strong. Constructed to work off 110 volt circuit, but easily adapted by means of a group resistance for any electricity supply up to 250 volts.

It can be converted to a motor-driven model and by the addition of a super attachment 300ft. Super reels can be shown.

Motor. To eliminate hand cranking -	£3. 0. 0
Super Attachment for 300ft. reels -	£2. 2. 0
Resistances for over or under 110 volt & electricity supply - - - -	10. 0



THE LUX £21.10.0



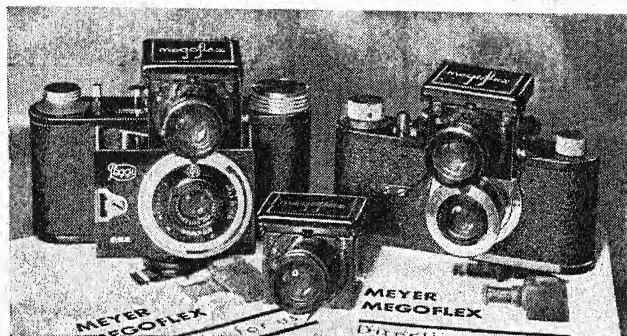
Powerful direct illumination, automatic safety shutter, fan for cooling the lamphouse, and a high-grade projection lens—these are some of the many fine points of the "Lux" Projector. Super reels can be projected with absolute clarity and brilliance as well as 30ft. and 60ft. reels. Sold in a de luxe case complete with motor, group resistance for all voltages, and ammeter, this projector typifies the height of performance with the lowest possible initial cost for superb quality motion-pictures in the home.

PATHÉSCOPE LTD.

5 Lisle Street
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Hugo Meyer & Co.

PHOTOGRAPHY OPTICAL WORKS CINEMATOGRAPHY

**MEGOFLEX CRITICAL FOCUSSER**

REFLEX ATTACHMENT (Patent) for

PEGGY LEICA CONTAX

The Illustration shows the Megoflex in position and detached.

The Megoflex is Compact and Light.

Easily carried in the pocket.

Weight only 6 ozs.

Measures only $1\frac{1}{2}'' \times 1\frac{1}{2}'' \times 3\frac{1}{2}''$.

The Megoflex provides Reflex facilities for these Miniature Cameras.

ABSOLUTE ACCURACY. NO DISTANCE METER REQUIRED.**CORRECT FOCUS OBTAINED WITH ABSOLUTE CERTAINTY.**

The Megoflex is attached in an instant and can be used at ANY ANGLE.

In principle the Megoflex is a small camera with a twin high grade Anastigmat.

It throws a full size (24 x 36 mm.) picture on to a horizontal screen (Magnifier provided).

The Megoflex Anastigmat is of identical focus to that fitted to the Peggy,

Leica or Contax (only 45 mm. and 50 mm. made).

WHEN ORDERING, STATE CAMERA MODEL, Leica I or II, and focus of Camera lens.The Megoflex lens couples automatically with the camera lens. **Absolutely dual focussing movement of both lenses.****Price £5 15s. 0d.**

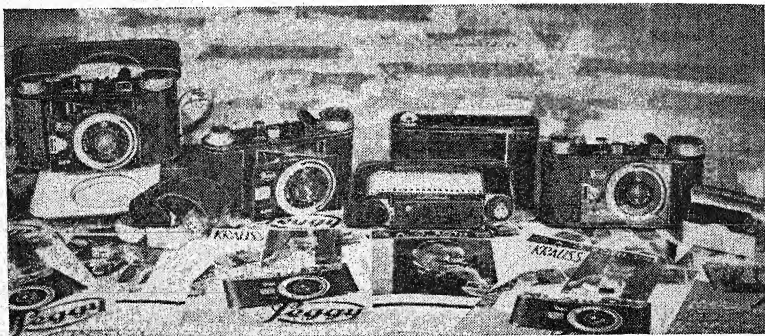
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"Mentorflex
Catgreen
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KRAUSS PEGGY THE 24 × 36 mm. NEGATIVE 36 EXPOSURE CAMERA WITH OUTSTANDING FEATURES.

HAS the most simple loading device.
HAS the most precise shutter. Speeds, 1 second, $\frac{1}{2}$, $\frac{1}{5}$, $\frac{1}{25}$, $\frac{1}{50}$, $\frac{1}{100}$ and $\frac{1}{300}$ and B.
HAS Automatic focussing.
HAS the advantage of Film Cutting Device. Any number of exposed films can be cut off for development as desired and the unexposed portion of film attached again in a second for further exposures. No tapered end required for restart of unexposed film.

NO rewind of discharged spool. Danger of scratching film avoided.
 The Slower speeds of the specially designed Silent Shutter permit the use of wide aperture lenses to the fullest extent for night exposures, artificial light.

Daylight Loading. Loaded in a second. The mechanical design of the Peggy Camera is such that a child can use it.

No working complications.

THE PEGGY REPRESENTS THE LATEST ACHIEVEMENT IN MINIA-TURE CAMERA CONSTRUCTION

A First Class Precision Instrument.

It combines Neatness, Precision and Simplicity.

Double Exposures Impossible.

Takes all the standard makes of films made for these 24 × 36 miniature cameras

Write for Descriptive Booklet.

PRICES.

		£	s.	d.
Krauss Peggy Camera fitted	Tessar F/3.5. Focus 50 mm. ...	22	10	0
"	" " " Tessar F/2.8. " 50 mm. ...	29	15	0
"	" " " Meyer Makro-Plasmat F/2.7. Focus 50 mm. ...	30	10	0
Leather Carrying Case. Holds the camera in position with patent flap, ready for exposure, without removing camera from case ...		1	5	0
The case is so designed that all the working parts are free when the case is open.				
Filter No. 1 for F/3.5 lens ...		0	18	0
Filter No. 2 for F/2.7 lens ...		1	5	0
Wire release ...		0	4	6

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Takes all Miniature
Negatives.

PEGGY LEICA
CONTAX (24×36 mm.)

3 × 4 cm. 4 × 4 cm.
4½ × 6 cm. film.

OPTIC. MEYER
PRIMOTAR
ANASTIGMAT
F/3.5, Focus 2½".
PERFECT DEFINITION.
Focussing Mount.
Iris Diaphragm.

2½" Optically Worked
CONDENSER.
PERFECT EVEN
ILLUMINATION.

Patent Film Guide with
optically worked pressure
plates.

Holds the film perfectly flat
like a glass negative.

PATENT UNIVERSAL
PRINTING FRAME.

Enlargements from
3½" × 2½" — 10" × 8".
With automatic white
margin device. ⅛" — ¼".

A strip of negative can be passed through the gate without cutting. Vertical pillar, smooth helical screw motion. Exceedingly precise in adjustment. Well ventilated Lamp House. Illuminant, 75-Watt Lamp. Flex and pin plug. Exposure switch on base next to printing frame. Most conveniently placed.

PRICES.

	£	s.	d.
Enlarger, complete with Meyer Primotar F/3.5 Anastigmat Focus 2½", Optical Condenser, 75-Watt Lamp, Switch, flex and plug and set of 3 Masks	16	10	0
Universal Automatic Printing Frame	4	16	0
Optically worked Red Filter	1	10	0

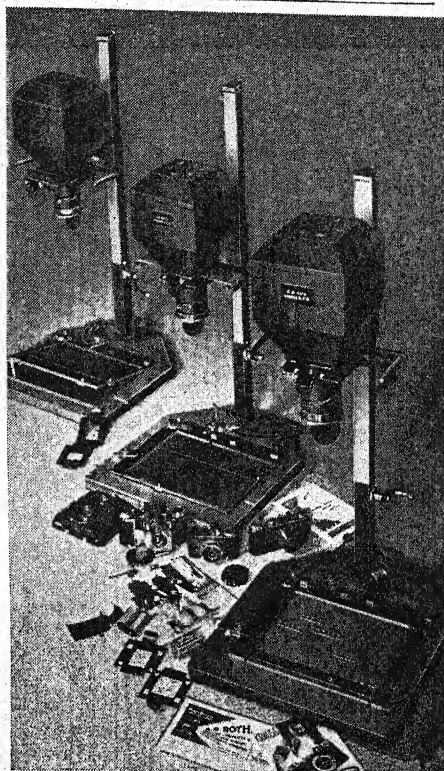
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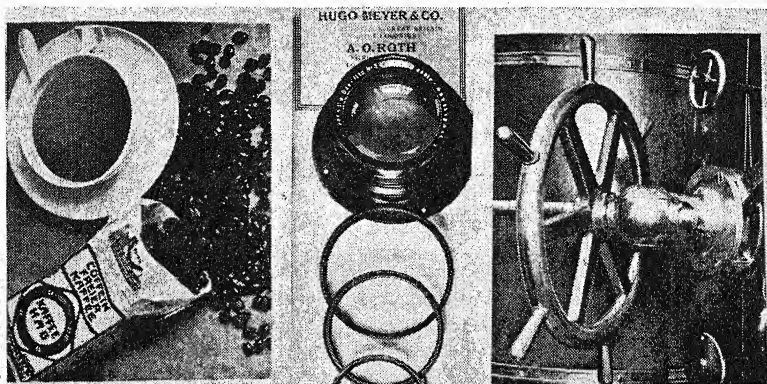
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MEYER Double Anastigmat Series F/6.8 COMBINABLE

FOR COMMERCIAL PHOTOGRAPHY OF ALL DESCRIPTIONS

Critical Definition.

Free from Flare.

High Degree of Colour Correction. | Correct Perspective Ensured.

Supplied in Standard Iris Mount and up to 9½" Focus in Compound Shutter.

CEMENTED CONSTRUCTION. SYMMETRICAL DESIGN.

Angle Approx. 90°.

The spherical, chromatic and anastigmatic corrections are carried out to the fullest possible degree and coma is completely eliminated.

IN FOCI FROM 1½"—30".

PRICES. Gold Standard.

Focus. Inches.	Standard Mount.	Sunk Mount.	Covers. Inches.	Code Word.	
				Stand Mt.	Sunk Mt.
6½	£ s. d. 8 10 0	£ s. d. 9 0 0	6½ × 4½	Vaida	Dank
8½	14 0 0	14 10 0	8½ × 6½	Vallid	Darm
10½	20 0 0	—	10½ × 8½	Vampir	—
12	25 0 0	—	12 × 10	Vanad	—
14	30 10 0	—	14 × 12	Vanloo	—
16½	40 0 0	—	16 × 12	Vapeur	—
19	52 0 0	—	17½ × 16	Varazze	—
24	70 0 0	—	24 × 20	Valpo	—
30	95 0 0	—	28 × 22	Varde	—

FOR SPECIAL NOTICE.

25 per cent. has to be added to prices marked Gold Standard.

For Sales in the United Kingdom.

Export Discount 25 per cent. Carriage, packing and Insurance extra at cost.

ALL PRICES ARE SUBJECT TO ALTERATION WITHOUT NOTICE.

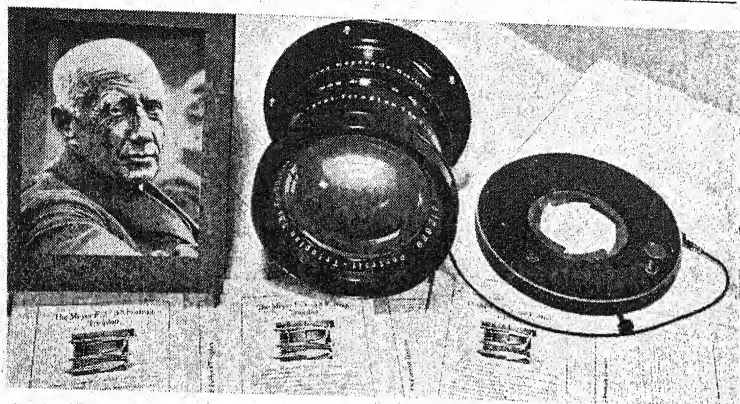
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Meyer Trioplan Portrait Anastigmat F/3

Combines Extreme Speed with
Critical Definition.

Soft Focus Device for
Foci $10\frac{1}{4}"$ — $16\frac{1}{2}"$
only £7 10s. 0d.

Pleasing Modelling.
So Essential for Perfect
Portraiture.

Short Exposures with Moderate
Studio Lighting.
Foci from $3\frac{1}{2}"$ — $19"$.

INDISPENSABLE FOR THE MODERN STUDIO.

PRICES.

Focus.	Standard Mount.	Square Flange.	Suitable for	Code Word.	Silent Central Shutter for Front.
Inches.	£ s. d.	£ s. d.	Inches.		£ s. d.
$10\frac{1}{4}$	31 5 0	0 15 0	7×5	Watt	4 5 0
12	36 5 0	1 0 0	$8\frac{1}{2}\times 6\frac{1}{2}$	Wage	4 17 6
14	50 0 0	1 5 0	$8\frac{1}{2}\times 6\frac{1}{2}$	Wagner	5 12 6
$16\frac{1}{2}$	72 10 0	1 10 0	10×8	Walkure	7 0 0
19	87 10 0	1 15 0	10×8	Waffe	8 2 6

Silent Before-Lens Shutters allowing for Short Exposures.

Lens shade diameter $1\frac{5}{16}"$. Price from £1 17s. 6d.

to
Lens shade diameter $6\frac{1}{2}"$ Price £8 2s. 6d.

FOR SPECIAL STUDIO REFLEX OUTFITS SEE OTHER PAGES.

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PLASMAT LENSES



PLASMAT LENSES

*Attaining Technical Perfection in Photography
The Part Played by a Well-known Lens*

The Credit for Producing a complete Colour Corrected Lens is due to

DR. PAUL RUDOLPH

who introduced a Sphero-Achromatic objective
known throughout the photographic world as
THE PLASMAT.

COMBINABLE

The single components form excellent long focus lenses.

The Plasmat gives natural atmosphere, perspective and convincing plasticity, also perfect reproduction of light and shade in the gradations actually existing.

The MEYER PLASMAT is suitable for all classes of photography where critical definition, speed and great covering are required.

INTERIORS are best taken with the Meyer Plasmat, wider angle and better perspective are obtained.

IN FOCI FROM $2\frac{1}{8}$ "—19'.

PRICES.

Combined Focus.	Single Component.	Standard Mount.	Sunk Mount.	Plate Covered.	Code Word	Sunk Mt.
Inches.	Inches.	£ s. d.	£ s. d.	Inches.	St. Mt.	
3½	6	14 7 6	15 0 0	3½ × 2½	Pacos	Pardel
4½	6½	15 0 0	15 12 6	3½ × 2½	Paddy	Pardo
4½	7½	16 17 6	17 10 0	4½ × 3½	Padua	Pari
5½	8½	18 15 0	19 7 6	4½ × 3½	Paga	Parnon
6	9½	20 0 0	20 12 6	4½ × 3½	Page	Paros
6½	10	20 12 6	21 17 6	5½ × 4	Pagina	Pascha
7	12	26 5 0	27 10 0	6 × 4	Pagus	Papius
				(10 × 15 cm.)		
7½	12½	28 2 6	29 7 6	6½ × 4½	Paka	Passir
8½	13½	31 5 0	33 2 6	7 × 5	Paladin	Pastete
9½	16	45 0 0	47 10 0	8 × 5	Palar	Papiros
10½	17½	53 15 0	—	8½ × 6½	Palette	—
12	19½	65 0 0	—	9 × 7	Palki	—
14½	23½	90 0 0	—	10 × 8	Pallas	—

For Plasmats F/1.5 for Cine Work, see other pages.

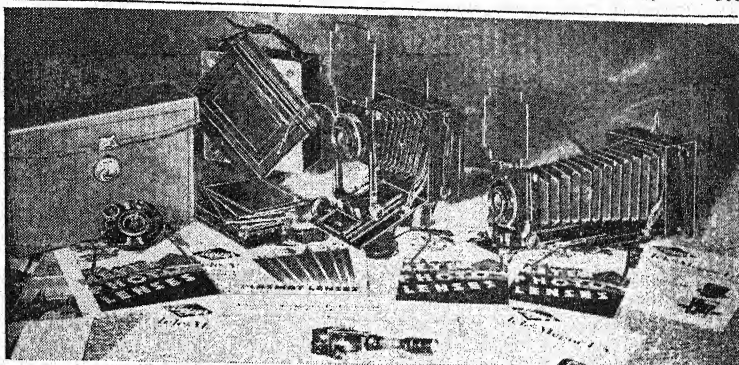
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"Mentorflex
Catgreen
London"

Sole British Distributor:

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MEYER UNIVERSAL SILAR CAMERA

The Camera for every purpose.

INDOOR PORTRAITURE.

ARCHITECTURE. LANDSCAPE. INTERIORS.

WIDE ANGLE WORK.

SPORT AND ACTION PICTURES.

THE MOST PERFECT COMBINATION.

Body Die Casting Machined. Rigid as a rock at full triple extension.

Full size direct vision frame finder.

Rising and Drop Front. Swing and Tilt. Drop Baseboard for Wide Angle work.

Body covered in finest morocco.

Revolving back, with patent spring device which allows the dark slide to be pushed into position **without** removing the focussing screen

Interchangeable lens panels. Lens cells in Compur Shutter are provided with Bayonet mount.

Swift interchanging of lenses.

PRICES. Gold Standard

Prices with Compur Shutter and 3 Nickel Slides

No.	Lenses with Compur Shutter	4½×6 cm. 2½"×1½"		6½×9 cm. 3½"×2½"		9×12 cm. 3½"×4½"		10×15 cm. 3½"×5½"		13×18 cm. 5"×7"	
		Foc.	Price	Foc.	Price	Foc.	Price	Foc.	Price	Foc.	Price
			£		£		£		£		£
50	Meyer Double Plasmat F/4	3"	24 10 0	4½"	28 0 0	6"	35 0 0	7"	43 0 0	8½"	52 0 0
52	Meyer Plasmat Set F/4.5	3½"	23 5 0	4½"	27 10 0	6"	34 5 0	6½"	38 10 0	8½"	52 10 0
54	Meyer Eurypian F/6 Set	3"	18 15 0	4½"	23 5 0	6"	28 10 0	6½"	34 10 0	8½"	41 10 0
55	Meyer Aristostigmat F/4.5	3"	19 5 0	4½"	24 10 0	6"	31 0 0	7"	37 0 0	8½"	44 15 0
	Nickel slides each	—	—	—	0 5 8	—	0 6 5	—	0 7 10	—	0 8 9
	Filmpack Adapter	—	—	—	0 8 9	—	0 12 3	—	0 14 0	—	1 1 0
	Leather case	—	—	—	2 13 0	—	3 10 0	—	4 16 0	—	7 0 0
	Focussing magnifier	—	—	—	—	—	—	—	—	—	—
	6 Times	—	—	—	1 15 0	—	1 15 0	—	1 15 0	—	1 15 0
	Yellow filter	—	—	—	0 10 6	—	0 15 9	—	1 1 0	—	1 6 3

Price of Wide Angle Lenses as on Page 558.

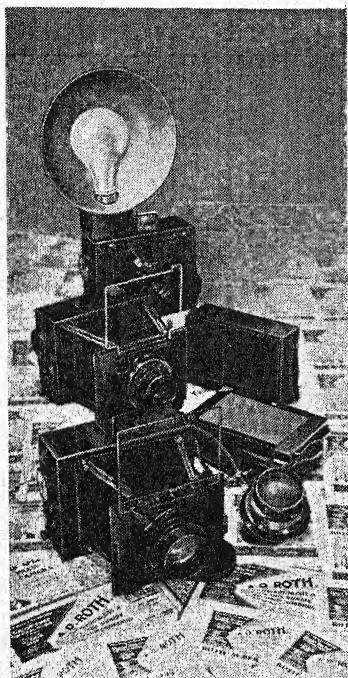
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ROTH PRESS SUPERSPEED

Focal Plane Outfit

MEYER F/3 ANASTIGMAT

SOLID

LIGHT

COMPACT

RELIABLE

RIGID

Important events such as "The Signing of the Locarno Pact" and "The Indian Round Table Conference" were taken with these outfits and the Meyer F/3 Anastigmat under the most difficult lighting conditions, and surpassed results obtained with any other make. Proof is given by the enormous publication which these pictures had.

Excellent correction

Focal Plane Shutter
Self-capping or non-capping.
Speeds from 1/1000—1/5th.

Critical definition

Patent Top Scaling.

Re-adjustment of distance possible whilst holding the camera ready for exposure.

Good focal depth

Synchronisation for Flash Bulb exposure, £8 0s. 0d. extra.

Only supplied in 9 × 12 cm. plate size.

PRICES. Gold Standard

	£	s.	d.
9 × 12 cm. Press Superspeed Camera fitted MEYER F/3 ANASTIGMAT, focus 6", with Patent Top scaling, complete with 3 Double Dark Slides	51	5	0
Ditto. Fitted MEYER F/4 ANASTIGMAT, focus 6", with Patent Top Scaling and 3 Double Dark Slides	40	3	0
Extra Double Dark Slides or Film Pack Adapter ... each	1	17	0
Automatic Changing Box for 12 plates... ..	9	18	0

3½ × 2½. 10 × 15 cm. and ½ plate Focal Plane outfits.

Prices on Application

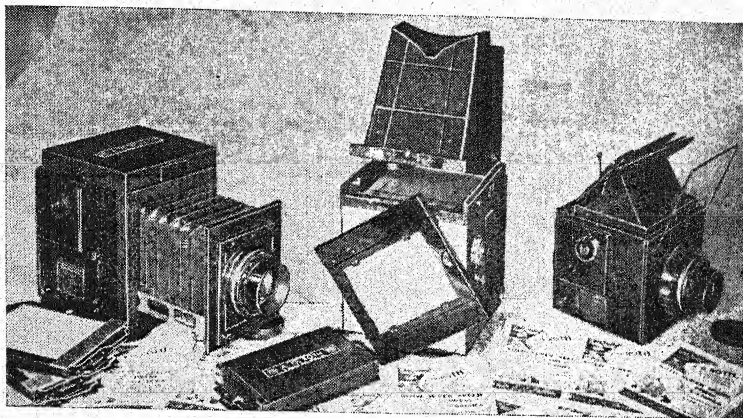
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DOUBLE EXTENSION REVOLVING BACK REFLEX CAMERA

The most precise, most rigid and most easily operated Reflex Camera

For Child Portraiture this instrument has proved a most valuable asset and is used by many of the well-known Portrait Artists who specialise in Child Photography.

FOR STUDIO.

A solid instrument with **TWO or FOUR STRUTS** for heavy long focus lenses. Top Silvered Mirror. Brilliant Reflex Image. The mirror action is a distinctive feature. **EVENLY BALANCED.** No jar during Exposure.

Can be had with **Spring** raised or **Hand** raised action.

FOR OUTDOOR.

Smooth, Silent Self-capping Focal Plane Shutter. Speeds 1/1000th—1 sec. and Time. Full size top focussing screen. Interchangeable lens panels. **Rising Front.**

TELEPHOTO Reflex Outfits for Cricket, Nature Studies, Wild Animal Photography our Speciality.

PRICES : Gold Standard

Plate size.	Meyer Plasmat F/4 Convertible	Meyer F/3 Anastigmat	F/1.8 Anastigmat	Dark Slides	Film Pack Adapter	Cowhide Leather Cases
$3\frac{1}{2} \times 2\frac{1}{2}$	£ s. d. 44 11 0	£ s. d. 52 0 0	—	£ s. d. 1 17 0	£ s. d. 1 17 0	£ s. d. 2 15 0
$3\frac{1}{2} \times 4\frac{1}{2}$						
9 × 12 cm.	56 18 6	64 0 0	106 0 0	1 17 0	1 17 0	3 18 0
10 × 15 cm.						
(4" × 6")	71 15 0	75 0 0	—	2 9 0	2 9 0	4 18 0
$\frac{1}{4}$ -plate (13 × 18 cm)	81 13 6	96 0 0	—	3 2 0	3 2 0	7 0 0

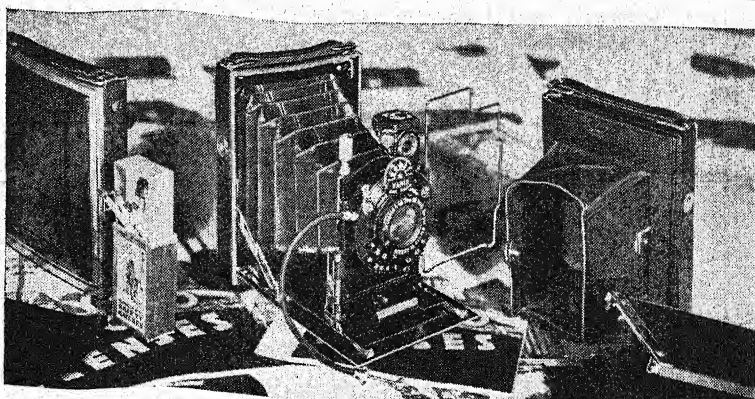
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THE POCKET COMPANION

Compact as a notebook.

Weight $3\frac{1}{2} \times 2\frac{1}{2}$ Model only approx. 16 ozs.

Weight 9×12 cm. Model only approx. 23 ozs.

For the serious Amateur Photographer.

Rising Front.

Brilliant and Direct Vision Finder for use at eye level.

DOUBLE EXTENSION MODELS.

INCLUSIVE 3 SINGLE METAL SLIDES AND FILM PACK ADAPTER

No.	Lens.		$3\frac{1}{2} \times 2\frac{1}{2}$ "			9×12 cm.		
			Focus ins.	Ibsor Shutter £ s. d.	Compur Shutter £ s. d.	Focus ins.	Ibsor Shutter £ s. d.	Compur Shutter £ s. d.
130/143	Meyer Trioplan	Anastigmat F/4.5	4½"	11 10 0	12 10 0	5½"	13 2 6	14 13 9
131	Meyer Trioplan	Anastigmat F/3.5	4½"	—	14 7 6	—	—	—
140	Meyer Double	Plasmat F/5.5	4½"	18 8 9	20 6 3	5½"	21 17 6	23 8 9
3 extra slides in case			...	0 8 9	...	...	0 11 0	...
Film Pack Adapter			...	0 13 0	...	...	0 14 6	...
Yellow Filter			...	0 13 0	...	...	0 17 0	...
Soft Chamois Leather Bag			...	0 15 6	...	...	0 17 6	...

Made entirely in light alloy with mechanical Morocco Leather. Covered in finest

THE MOST COMPACT PRECISION CAMERA ON THE MARKET.

SPECIAL MODEL Single Extension.

EXCELLENT Specification as above and fitted Meyer shutter. Three single slides and film pack adapter. **£7 15s. 0d.**

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ROLL FILM PRIMARETTE CAMERA

A REAL POCKET CAMERA

Negatives $4\frac{1}{2} \times 6$ cm (V.P.) 8-Exposure.

Accessible and easy loading.

Possesses all the advantages of a Reflex in a more compact form.

Measures only $4\frac{1}{2} \times 4\frac{1}{8} \times 1\frac{1}{4}$ ".

Weight only 1 lb. 4 ozs.

Centre illustration shows Camera open. Right illustration shows Camera closed. Left illustration shows Camera open at the back with focussing screen erected and the film exposed to view.

Note the two spare spools in their compartments on top.

Operated at eye level. Critical focussing. **No out-of-focus results.**

The picture can be seen before, during and after exposure, Vertical or Horizontal.

Synchronised focussing adjustment with finder view parallex correction.

NO CUT OFF AT CLOSE RANGE. SIMPLE LOADING.

Carries 24 V.P. Exposures in all.

Equipment: Compur Shutter, speeds 1 second—1/300th and Meyer F/3.5 Anastigmat Focus 3". Inclusive soft leather case	£ s. d.
Compur Shutter as above and Meyer Makro-Plumat F/2.7 Focus 3". Inclusive soft leather case	19 10 0
	27 0 0

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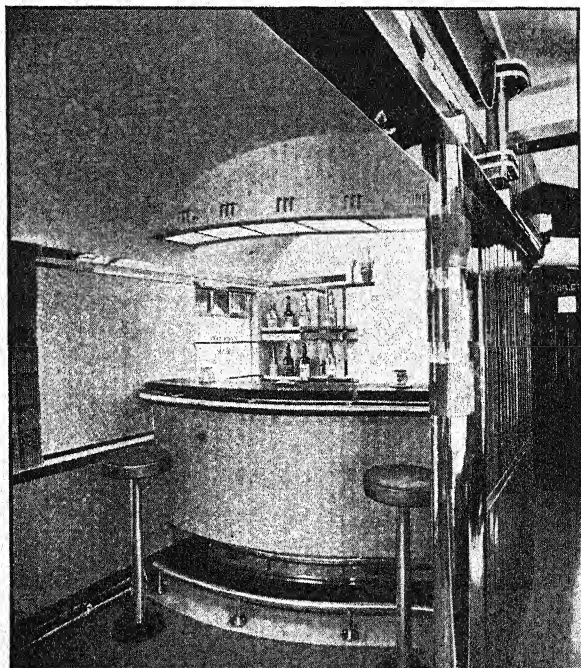
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MEYER Wide Angle ARISTOSTIGMAT F/9 Angle 100°

FREE FROM FLARE



FOR FLASH OR AGAINST THE LIGHT

COCKTAIL BAR ON THE "FLYING SCOTSMAN."

By courtesy of the Chief Mechanical Engineer
to the London & North Eastern Railway Co.

Photo by Messrs. Bedford Lemere & Co.
Taken with Meyer Wide Angle Aristostigmat F/9.

THE MOST SPEEDY WIDE ANGLE ANASTIGMAT.
SOLVES THE MOST DIFFICULT PHOTOGRAPHIC PROBLEM WITH EASE.
PRICES.

Equivalent focus. in.	At full aper- ture.	Standard mount.		Vario- Shutter.		Ibsor- Shutter.		Compur- Shutter.		Adapter Ring.
		£ s. d.	Code word.	£ s. d.	Code word.	£ s. d.	Code word.	£ s. d.	Code word.	
3½	4½ × 3½	6 15 0	Zirpe	8 5 0	Wabe	10 10 0	Wallone	12 0 0	Wespe	6 3
4	6 × 4	7 3 9	Zicke	8 13 9	Wache	10 18 9	Walnut	12 8 9	Wette	6 3
4½	7 × 5	7 10 0	Zirkel	9 0 0	Wachtel	11 5 0	Walze	12 15 0	Weste	6 3
5½	8½ × 6½	8 5 0	Zimmer	9 15 0	Waffel	12 0 0	Wange	13 10 0	Wimpel	6 3
6½	9 × 7	9 15 0	Ziege	11 13 9	Wahl	14 5 0	Wanne	15 15 0	Winkel	6 3
7	10 × 8	12 0 0	Ziel	—	—	16 10 0	Warte	18 0 0	Winzer	6 3

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MEYER TELE-MEGOR F/5.5

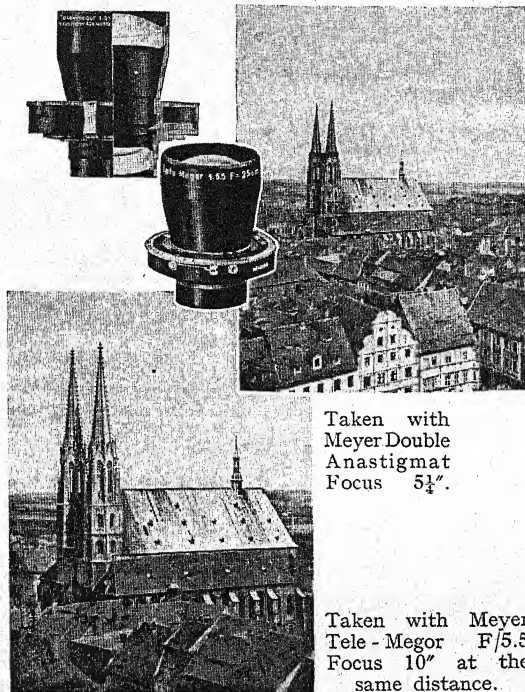
TELEPHOTO OBJECTIVE OF HIGH CORRECTION AND DEFINITION

For Roll Film and
Plate Cameras.

* The Infinity measurements in ins. indicate the camera extension required, measured from the flange to the focussing screen.

Interchangeable fitting to Client's own Compur Shutter.

Price as under standard mount.



Taken with
Meyer Double
Anastigmat
Focus $5\frac{1}{4}$ ".

Taken with Meyer
Tele-Megor F/5.5
Focus 10" at the
same distance.

PRICES FOR TELE-MEGOR F/5.5

Focus inches	Aperture F:	Standard mount £ s. d.	Compur Shutter £ s. d.	Sunk mount £ s. d.	Focussing mount £ s. d.	Suitable for inches	Infinity inches*
$7\frac{1}{8}$	5.5	10 14 0	14 14 0	11 8 0	12 14 0	$3\frac{1}{2} \times 2\frac{1}{2}$	$4\frac{1}{16}$
10	5.5	14 0 0	18 14 0	14 14 0	16 0 0	9×12 cm. ($3\frac{1}{4} \times 4\frac{1}{4}$)	$5\frac{5}{16}$
12	5.5	19 8 0	24 14 0	20 0 0	21 8 0	9×12 cm. or 10×15 cm.	$6\frac{13}{16}$
16	5.5	24 0 0	29 8 0	25 8 0	26 14 0	10×15 or 13×18 cm.	$9\frac{1}{16}$

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FOR THE 16 mm. CINEMATOGRAPHER MEYER KINO PLASMAT F/1.5

The complete correction of the Meyer Kino-Plasmat F/1.5 for the primary colours of the spectrum renders it the most perfect lens for KODACOLOR and BLACK and WHITE photography.

NO FOCAL DIFFERENCE AT THE VARIOUS STOPS.

Plasmat Screen Pictures are BRILLIANT, CRITICALLY SHARP AND SHOW IMPROVED PERSPECTIVE.

PRICES.

In Interchangeable Focussing Mounts for:

BELL HOWELL, CINE KODAK, etc. AUTOKINCAM VICTOR.

For 16 mm. Film.				For 16 mm. & Standard Film.			
Focus.	£	s.	d.	Focus.	£	s.	d.
1 1/2"	1 1/2"	...	...	...
1 3/4"	2"	...	...	...
2"	3"	...	...	...
2 1/4"	3 1/2"	...	...	...
2 1/2"				
2 3/4"				
3"				
3 1/4"				
3 1/2"				
3 3/4"				
4"				

SPECIAL Kodacolor MEYER KINO PLASMAT F/1.5, Focus 1",
£14 10s. 0d.

SPECIAL MEYER KINO PLASMAT F/1.5 WIDE ANGLE Focus
15 mm., interchangeable focussing mount. Bell Howell, Filmo 70d.
£15 10s. 0d.

Panchromatic Optically Worked Filters from £1 1s. 0d.

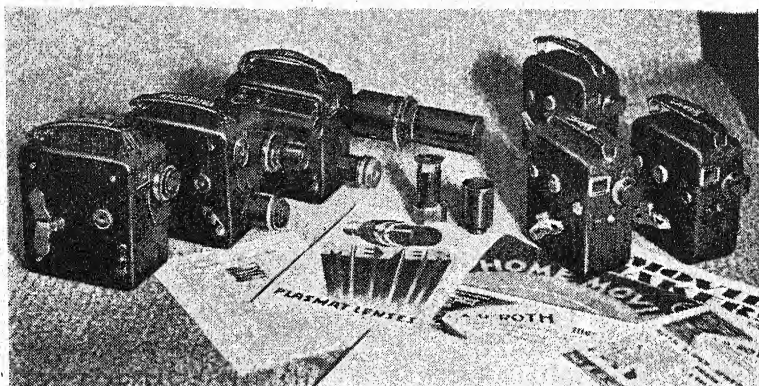
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**MOTOCAMERA DE LUXE FOR THE 9.5 mm.
CINEPHOTOGRAPHER**

Interchangeable lens fitting. Focussing mount Model

MEYER PLASMAT F/1.5

In recent years 9.5mm. Cine Photography has gained tremendously in popularity, mainly due to the fitting of superior lenses, such as the MEYER PLASMAT F/1.5 with its complete colour correction, and the possibility of focussing. For distant work the Meyer Telephoto Anastigmat F/3 is the BEST.

PRICES.

Motocamera De Luxe, fitted Meyer Plasmat F/1.5 in interchangeable focussing mount. For indoor and outdoor Photography ...	£	s.	d.
Meyer F/3. Telephoto Anastigmat in interchangeable focussing mount, together with optical matched finder. Magnification approximately 4x ...	27	10	0
Conversion of customer's own Motocamera De Luxe into interchangeable model, including remounting of standard lens into focussing mount ...	16	0	0
MEYER PLASMAT F/1.5 in interchangeable focussing mount ...	4	15	0
Filters Optically worked, for Plasmat F/1.5, 2x or 5x ... each	0	18	6
Filters Optically worked, for Telephoto F/3, 2x or 5x ... each	1	2	0
MODEL B. Motocamera, fitted Meyer F/2.8 Anastigmat ...	10	10	0
Conversion of customer's own Model B. Motocamera, and supplying F/2.8 Meyer Anastigmat ...	4	5	0
Filter Optically worked. Panchromatic. 2x ...	10	6	
Set of Supplementary Lenses, 6½', 3' and 20", complete with contrast filter ...	1	1	0
MOTOCAMERA DE LUXE, FITTED 8-POWER TELEPHOTO ANASTIGMAT F/3 and Meyer Makro-Plasmat F/2.7, Focus 1", with finder adjusted for parallex ...	68	0	0

FOR THE NATURALIST AND GAME HUNTER.

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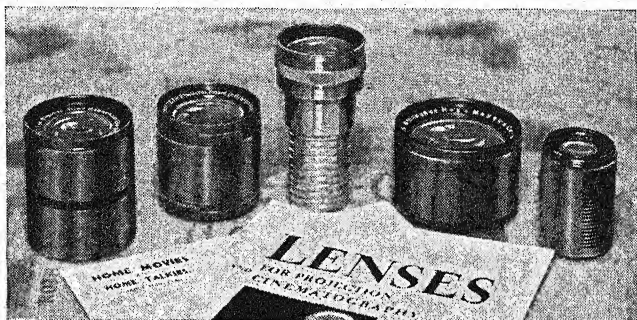
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However good the taking lens may be the ultimate results depend on the lens used for projection.

FOR STANDARD SIZE THEATRE SCREEN PROJECTION.
Diameter of Cylinder mount $2\frac{7}{16}$ ". In Foci from 4"—7".
PRICE £6 10s. 0d. Upwards (Prof.).

Diameter of Cylinder mount $2\frac{1}{16}$ ". In Foci from $2\frac{3}{4}$ "—7".
PRICE £4 10s. 0d. Upwards (Prof.).

FOR 16 mm. PROJECTION, BELL HOWELL, KODAK, ENSIGN, etc.
In Interchangeable Mounts. In Foci from $1\frac{3}{8}$ "—7".
PRICE from £6 10s. 0d.

FOR 9.5 mm. PATHE DE LUXE PROJECTOR.
In Interchangeable Mounts. In Foci from $1\frac{3}{8}$ "—7".
PRICE from £6 10s. 0d.

NEW. NEW.
MEYER WIDE ANGLE PROJECTION PLASMAT F/1.5.
ONLY in 20 mm. FOCUS.

In Interchangeable Mount for Pathe de Luxe Projector.

Gives a 40 per cent. larger picture at the same screen distance. An enormous picture can be shown in a very small room without the aid of a more powerful illuminant.

LARGE SCREEN SHOWS FOR CINE SOCIETIES, SCHOOLS, ETC.

PRICE £9 15s. 0d.

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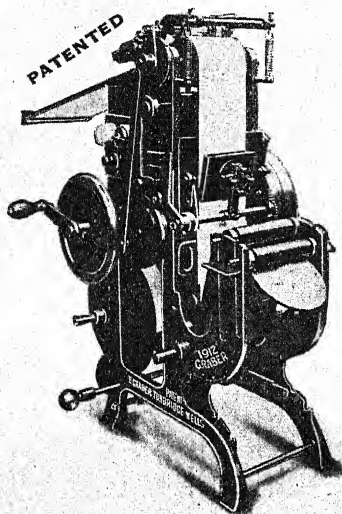
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COMBINED AUTOMATIC EXPOSING TYPE-
PRINTING, AND CUTTING MACHINE

For Bromide and Gaslight Postcards and Paper



This Machine is easily worked by unskilled labour, hand or power, and is fitted for Gas or Electric Light, for any make of Bromide or Gaslight paper or card.

1500 POST CARDS
in EACH HOUR

from one Negative (either glass or film) can be easily Exposed, printed on the reverse side from Type, and including any Imprint; also cuts in convenient lengths from the Reel, all in one operation for hand developing.

THE LENGTH OF EXPOSURE IS EASY OF ADJUSTMENT

to suit any density of Negative in a few seconds.

Changing of negative almost instantaneous, Patent Ingenious Mask Negative Carrier which dispenses with old and troublesome methods.

Every Photographer, Printer or Stationer may become his own publisher by using my machines.

THE GRABER FAMOUS MACHINERY

Embodies all improvements which have suggested themselves as being desirable, and in their present form represents the most perfect and practical machines now on the world's markets, for Photo Contact Printing, Developing, Fixing, &c., and Drying, in one working.

Please write for fuller particulars and New Illustrated Booklet with Testimonials and Samples of Work, to :—

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ELLIS GRABER, TUNBRIDGE WELLS,
KENT, ENGLAND.

Established in the year 1900.

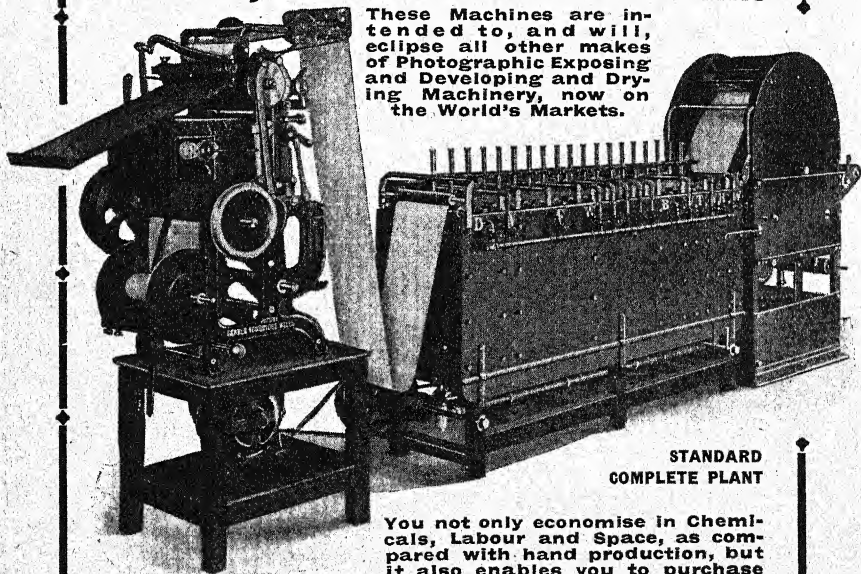
SUPPLIED TO ABOUT 25 COUNTRIES, & THE BRITISH, AMERICAN, ITALIAN, CHILEAN & CUBAN GOVERNMENTS.

STILL FOREMOST

INTERNATIONAL IN USE.

For producing the Finest Quality Bromide and Gaslight Real Photographic Productions, Postcard Printing, Developing, Fixing, Bleaching, Toning, Hardening, Washing and Drying; also Type Printing, simultaneously on reverse side of Picture, all in one rapid automatic operation

The GRABER PATENTED PLANTS
WITH OVER 25 YEARS' EXPERIENCE PUT INTO THEM
are the only **MACHINES THAT WILL DO THIS**



**STANDARD
COMPLETE PLANT**

You not only economise in Chemicals, Labour and Space, as compared with hand production, but it also enables you to purchase your card or paper IN THE ROLL AT A CHEAPER RATE THAN CUT SHEETS. This will very soon pay for the machines.

THE "ACME" PRINTING MACHINE (Patented) Exposes from Negatives and Type prints on the reverse side of the picture, and automatically registers number of exposures. Also will cut off for hand developing, if desired.

THE "NEW PERFECTED" DEVELOPING MACHINE (Patented) Develops, Rinses, Fixes, Washes, Bleaches, Rinses, Tones, Rinses, Hardens and finally Washes.

THE "ECLIPSE" NEW DRYING MACHINE (Patented) finally dries the work after washing and automatically re-reels or the card can be cut.

Net Weight of "Acme," "New Perfected" and "Eclipse" is about 17 cwt. Floor space for the complete plant is approximately 17 ft. by 3 ft. Power: The whole three Machines are driven by 1-h.p. motor.

E. GRABER *Specialist in Automatic Photographic Plant and Machinery.*

E.G.'s Machinery is known all over the world as the only Practical and Recognized Machinery that can produce

PERMANENT PHOTOGRAPHIC WORK

These Machines produce work which is sharp and refined, and a reliable Contact Printing of a high-class character.

E.G.'s Machines must not be confused with those which are MERE Toys periodically advertised and boomed under various camouflaged fancy names, the reason for so doing being best known to the makers and their agents.

The GRABER Machines have always been of All-British Manufacture, and have the reputation of always being known by the ONE name of "The Graber Machines."

The GRABER "ACME"

IS A RAPID ROTARY QUADRUPLE EXPOSING, TYPE-PRINTING and CUTTING MACHINE, and is SUITABLE for POST CARD and ALL-ROUND WORK,

Embodies the Latest and Up-to-date Labour-saving developments of the Automatic Exposing, Type-printing (on the reverse side) and Cutting-off Machine for High-Grade Bromide and Gaslight Photographs, with great speed, at minimum cost, by unskilled labour, at one and the same operation. Works accurately by hand or power.

It is the very latest design, incorporating improved switch and counter, also new paper feed quadrant to facilitate the correct cutting of various sized prints for hand developing.

Any make of Bromide or Gaslight Paper or Card may be used.

Designed for

Pictures 9 x 11 in.; or 1 or 4 Postcards;

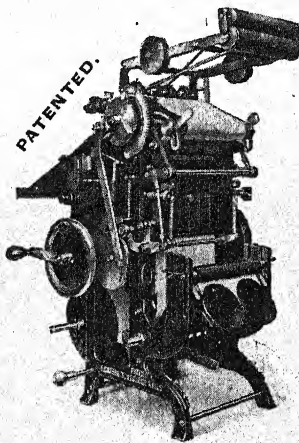
Or a number of Negatives. The feed of paper can be altered from 3 in., varying by $\frac{1}{2}$ in. up to 9 in. without waste. Will also cut off Post Cards in Sheets of Six Cards (10 $\frac{1}{2}$ by 11 in.) or Twelve Cards (21 in. by 11 in.) for Hand Developing, if desired.

This model can now also be supplied larger to

MEET AMERICAN AND OTHER DEMANDS TO PRINT AND CUT PICTURES UP TO 11 x 14

A Large Output at a Minimum Cost.

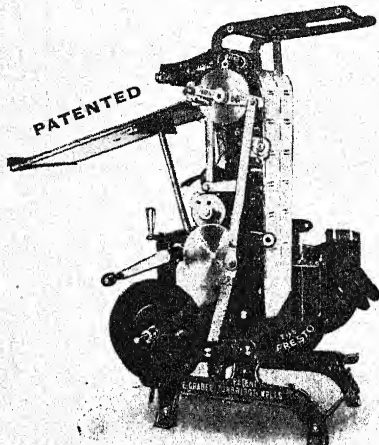
Will expose from two ordinary Post Card Negatives and Type-print on the reverse side of the Card, from 3,000 to 4,000 per hour: or Expose from four Post Card Negatives, 6,000 to 8,000 per hour.



"THE PRESTO" (GRABER'S)

AUTOMATIC POST CARD TYPE PRINTING & CUTTING MACHINE FOR SENSITIZED CARD MAKERS. Cuts in strips of 6's, or singly.

**THE MACHINE IS SIMPLICITY.
A BOY OR GIRL CAN WORK IT.**



Is designed to print from the roll, and to produce 3,000 to 4,000 Post Card Headings per hour, from two blocks, placed side by side, with Publishers' Imprints as required, and works from 11 in. roll, or 2 rolls 5½ in. Imprints are easily changed. The machine cuts off automatically Post Cards in strips of 6's or 12's or singly. After printing 6, a patent automatic movement allows a gripping edge of ¼ in. at top or at bottom, viz., 21½ ins. or ¼ in. at top and ¼ in. at bottom, viz., 22 in. when required. A patent impression bed and Type Chase facilitates a quick make ready. Works accurately by hand or power, minus a skilled operator.

SOME USERS of my Machines.

- *Acme Photo Co., Norfolk U.S.A.
- *The Aerial Photo Co., Peterborough.
- *Associated Screen News, Ltd., Montreal.
- *Aurelio Loyo, Orizaba, Mexico.
- *W. & T. Avery, Ltd., Birmingham.
- *American Photo Supply Co., Mexico.
- *Bell's Photo Co., Ltd., Leigh-on-Sea.
- *Bromo Photo Co., Ltd., Lewisham.
- *J. F. Carrie, Carpentras, France.
- *Antonio Cortinas, Havana, Cuba.
- *Criterion, Ltd., Birmingham.
- *Compania Chilena De Tabacos, Valparaiso
- *W. T. Cook, Upper Caterham.
- *Fernandez & Carbonell, Barcelona
- *Francisco I. Ferrando, Veracruz.
- *Etienne Franck, Ghent.
- *A. Garriga, Barcelona.
- *L. Gevaert & Co., Antwerp.
- *Em. Goes, Ostende.
- *Graphic Times Sun Co., Tokyo.
- *Granville Gulliman, Ltd., Leamington Spa.
- *Fred Hardie, Aberdeen.
- *Harvey Barton & Sons, Ltd., Bristol.
- *Byron Harmon, Banff, Alberta.
- *S. J. Hayward, Montreal.
- *Ilford, Ltd., Ilford.
- *Jarrod & Sons, Norwich.
- *W. N. Jennings, Philadelphia.
- *Judges, Ltd., Hastings.
- *R. Johnston & Son, Gateshead.
- *Kodak, Ltd., Hungary.
- *Kodak, Ltd., London.
- *Kosmos Photographics, Ltd., Letchworth.
- *S. Kuwada & Sons, Osaka, Japan.
- *A. H. Leach & Co., Brighouse, Yorks.
- *S. T. Leigh & Co., Sydney.
- *Les Grandes Imprimeries, Belges.
- *Lilywhite, Ltd., Halifax, England.
- *Lyall Photo Co., Ltd., Winnipeg.
- *Geo. Lykides, Salonica, Greece.
- *T. H. Mason, Dublin.
- *Marshall & Co., Nottingham.
- *J. L. Nerlien, Oslo, Norway.
- *National Photograph Co., Chicago.
- *Hugh & G. K. Neill, New Zealand.
- *Harald Olsen, Stockholm.
- *Enrique H. Ortiz, Habana, Cuba.
- *Paget Prize Plate Co., Watford.
- *Pesha Art Co., Marine City, U.S.A.
- *Photo Services, Ltd., Shrewsbury.
- *Photochrom Co., Ltd., Tun. Wells.
- *J. K. Piggott, San Francisco.
- *Rotary Photo Co., Ltd., West Drayton.
- *Stadler Photo Co., Chicago.
- *Stadler Photo Co., New York.
- *Societa Italiana "Gyska," Rome.
- *Scholastic Souvenir Co., Blackpool.
- *The Gowen Sutton Co., Vancouver.
- *The Little Art Shop, Woodstock, N.Y.
- *Valentine & Sons, Ltd., Dundee.
- *Venturi, Bologna, Italy.
- *Vickery Bros., Ilfracombe.
- *Walton Photographic Co., London.
- *Wellington & Ward, Ltd., Elstree.
- *S. D. West & Son, Whitstable.
- *West-Dempster, Co., Grand Rapids, Mich.

* REPEAT ORDERS.

AND MANY OTHERS.

Rolleiflex

THE NEW AUTOMATIC REFLEX CAMERA



The New '6 x 6' Rolleiflex is an unusual camera giving unusually good results at unusually low running costs. Amongst many advantages the following are included. Use of roll film. Separate taking and finder lenses. Instant readiness for use. Everything possible has been made automatic so that with the camera in the ready position you can see your picture on the screen, the focussing, the lens stop and speed adjustments, in one glance. Gives 12 pictures, 2½ x 2½ on 3½ x 2½ roll film, at a cost of only 1d. each.

With Zeiss-Tessar F/3.8

£22 10 0

With Zeiss-Tessar F/4.5

£20 0 0

The Rolleiflex is also made in a smaller size, 4 x 4, giving 12 exposures, measuring 1½ x 1½ on a standard Vest Pocket Roll Film

With Zeiss-Tessar F/2.8 **£22/10**
F/3.5 **£20**

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LONDON, W.C.1

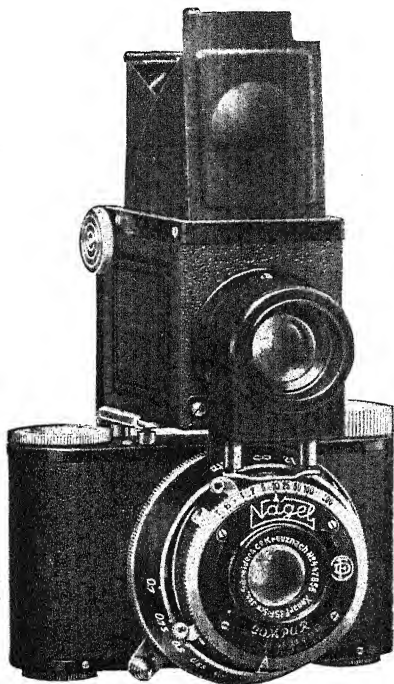
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Phone: Holborn 7811/2

**THE
NAGEL**

Rolloroy

WITH
REFLEX MIRROR ATTACHMENT



The Rolloroy small film camera is already world famous as a second-to-none precision instrument. As one user writes, "Its smallness, convenience, stability and optical efficiency are a happy combination." Or as another puts it, "Its simplicity and precision stamp it with the mark of perfection."

The Reflex mirror attachment, illustrated, is an entirely new and specially valuable auxiliary, which transforms the Rolloroy into a tiny and practical reflex camera.

With Leitz Elmar F/3.5 Lens in Compur Shutter, complete with Solid Lined Hide Velvet Case

£15 15 0

With Zeiss Tessar F/3.5 ditto,

£15 15 0

With Zeiss Tessar F/2.8 ditto,

£18 10 0

With Xenon F/2 ditto,

£21 10 0

Reflex Attachment, plus a small charge for fitting ... **£5 10 0**

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THE "CELFIX" SCREEN

THE WORLD'S FINEST CINÉ SCREEN

Patented throughout. English Patent No. 345925

WITH CRYSTAL GLASS-BEADED AND SILVERED SURFACES

This ultra-modern screen for home movies and home talks supercedes all others by its special surfaces and clever construction. The Crystal Glass Beaded surface gives the ideal projected picture, clear and outstanding, sparkling with life, yet completely lacking a harsh unpleasant light.

The Silvered surface also gives a sharp, luminous, restful picture only a degree or two less brilliant. So cleverly constructed is the Celfix that in an instant it stands rigid and drum tight ready for use. There are no loose parts; the whole screen rolls itself sweetly and compactly into a sturdy, yet light box, ready to be carried or put away. Made in 5 sizes.

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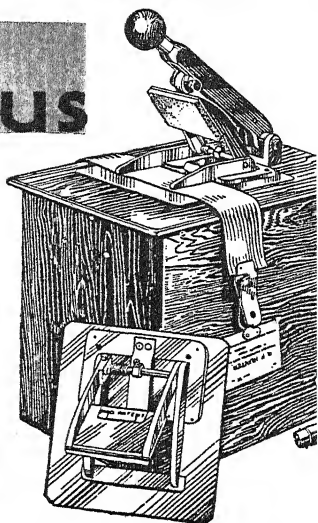
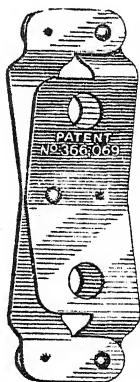
Phone: Euston 7112

D and P APPARATUS

No. D.P.2 PRINTER

New British Invention. Makes trimming unnecessary. Can be supplied with interchangeable platens for printing V.P. $3\frac{1}{4}$ x $2\frac{1}{4}$, 1A, $\frac{1}{2}$ -plate, P.C. (or any other size to order). This machine at moderate cost saves money by cutting out the time previously spent on trimming.

No. D.P.2 machine with electric globe and 7-ft. flex and plug ...	Net
Platens each ...	£3 0 0
	£1 10 0



No. D.P.1 DOUBLE FILM CLIP

The only clip of its kind. No rivets easily detachable and attached. Guaranteed to withstand all chemical action. British made of best quality Stainless Steel.

10/- doz. £5 10 0 per gross Net.

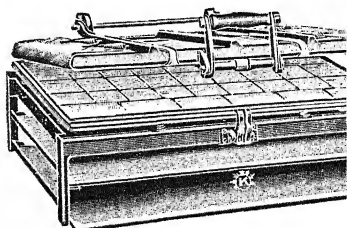
THE KINDERMANN GLAZING PRESS

For electric current.

D. Luxe model, as illustrated, in two sizes—18 x 12 £13/15/- Net. 24 x 18 £20/- Net

Also Junior pattern for electric current, made in three sizes, prices from £4 net.

These machines produce beautifully glazed prints in 3 to 4 minutes.



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BELL & HOWELL FILMO

Motion Picture Equipment

FILMO J L PROJECTOR

The Finest in the World

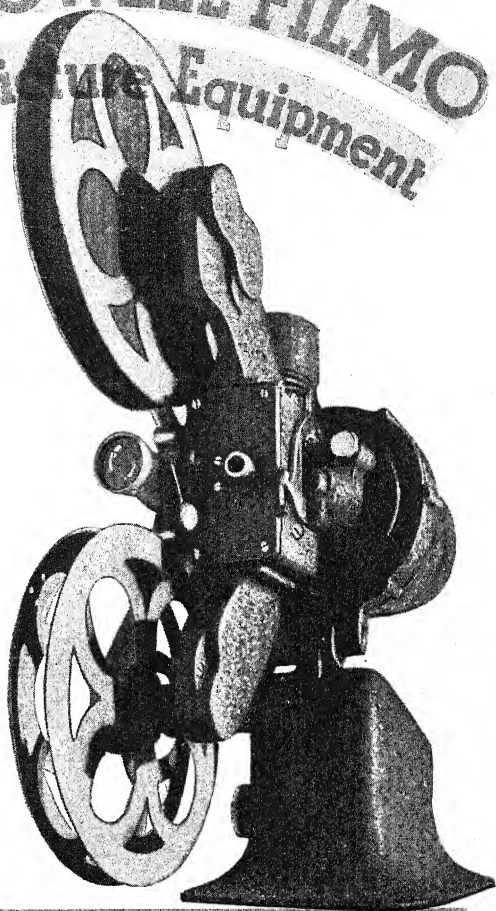
for the projection of 16 mm. motion pictures. It shows pictures of unsurpassed clarity and brilliance, free from any trace of flicker. In addition to the usual Filmo refinements Filmo J L possesses these advantages:—
Gear driven throughout—belts totally eliminated.

Automatic Geared Re-wind by ingenious clutch mechanism, at the touch of a lever.

New Lens. Cooke 2 inch F/1.65 lens of entirely new design—giving more light than ordinary lenses. More powerful reflector giving startling black and white and Kodacolor results.

Highly efficient cooling allowing the use of a 400 watt lamp. No light from the projection lamp escapes through the *Light Trap* to the ceiling. *New Pilot Lamp* which automatically goes off as the projection lamp is turned on. *New Tilt Control* to enable pictures easily to be centred.

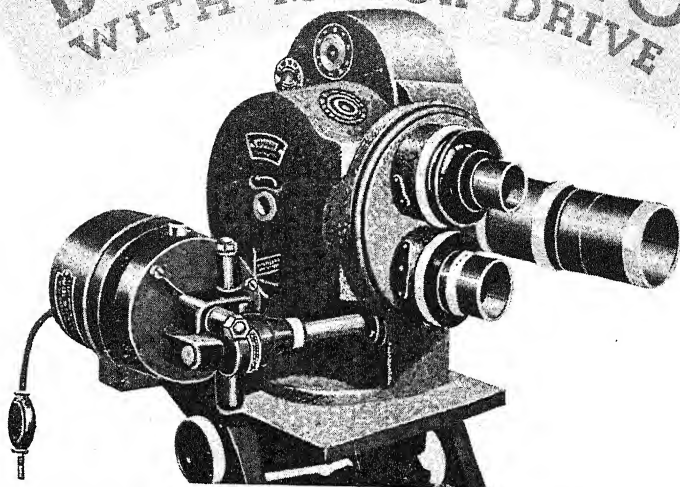
Illuminated Voltmeter dial. Concealed wiring. Radio interference eliminator.



BELL & HOWELL COMPANY Ltd

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CHICAGO - HEAD OFFICE AND FACTORY: 1801, LARCHMONT AVENUE
NEW YORK - 11, WEST 42nd STREET (near 5th Avenue)
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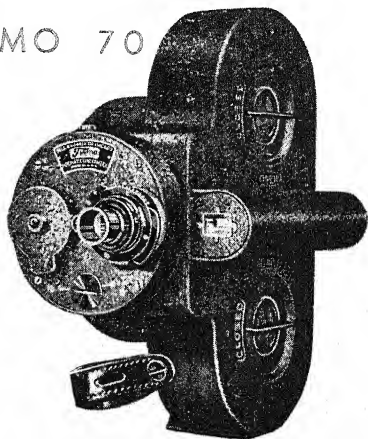
B & H EYEMO WITH MOTOR DRIVE



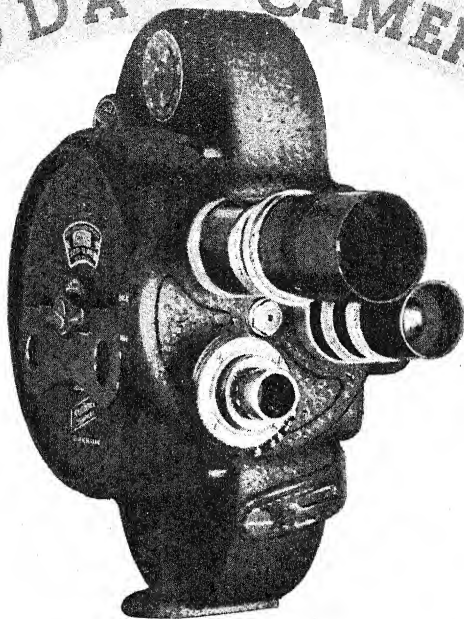
Bell & Howell announce the Eyemo Camera for 35 mm. film now fitted with electric motor to operate on 12 or 110 volts. This new Eyemo is extensively used for news reel work and a considerable number have been supplied to professional studios at Hollywood and elsewhere for use in situations where the use of the major B. & H. studio camera is impracticable. Can also be supplied with 200-ft. and 400-ft. magazines. Full details on request.

THE FAMOUS FILMO 70 CAMERA

is the original automatic personal movie camera and has been the standard amongst amateurs since the beginning of 16 mm. movie making. So advanced was its original design that it is still the finest amateur movie camera to be had at any price. It is available in a number of models and sub-models, differing in lens equipment, and operating speeds, the most popular of which are Filmo 70-A regular model with 8 and 16 frames a second. Filmo 70-AA, double speed, 16-32. Filmo 70-AB with three speeds, 12, 16, 24. Filmo 70-B for super speed work at eight times the normal speed i.e. (128 exposures per second) giving extreme s-l-o-w motion pictures when projected on the screen.



BELL & HOWELL FILMO 70 DA CAMERA

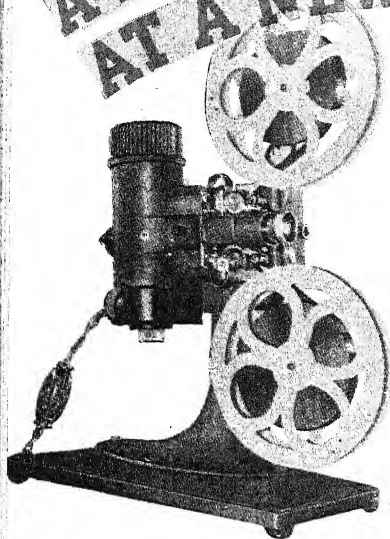


The 70-D and 70-DA Filmo Cameras are the most complete amateur movie cameras produced anywhere—the crowning achievement of Bell & Howell's 25 years experience in professional and amateur cine camera manufacture. Here are its main features: *7 film speeds* from 8 to 64 frames a second *Turret Head* to accommodate any 3 lenses. *Spy glass Viewfinder*, variable for 6 different focal length lenses. *Button Control*, camera cannot run while turret head is being moved. *New Governor* for instantaneous starting and stopping on a single frame without retarding, etc. DA model has *critical focuser* which permits focussing as fine as a hair on any object near or far. And all the usual Filmo 70 refinements.

TAYLOR-HOBSON COOKE LENSES

the world famous lenses used by most professional producers at Hollywood, Elstree and throughout the world—are supplied as standard equipment with Filmo apparatus. Made in England by veterans of the art, Cooke lenses have earned for themselves the premier place in professional and amateur cinematography.

A FINE NEW PROJECTOR
AT A NEW LOW PRICE



FILMO M & N PROJECTORS

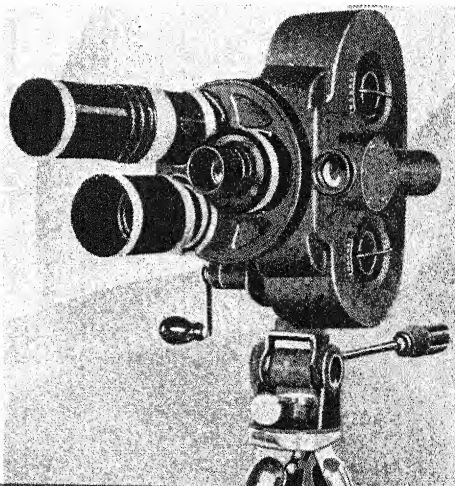
Its maker's reputation, its extreme simplicity its true excellence, and its price, all highly recommend the new Filmo Model M. Its pictures are brilliant, steady and flickerless. It is so well built that, like other Filmo Projectors before it, Model M will give year after year gratifying service. No Filmo has ever worn out. Model M is a single control projector. No projector could be more simple to use. Just thread the film and press the single switch. Movies flash upon the screen. There are no non-essential controls to confuse the least experienced user.

Model M has the standard Bell & Howell single tooth shuttle movement. The same projector may be had with a double tooth movement, and when so equipped is known as Model N

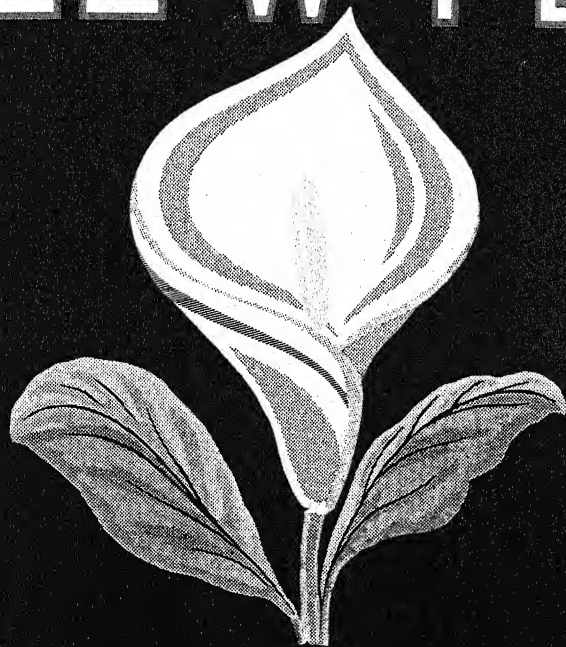
EYEMO C for 35 mm. Films

Not only includes the main features of the now famous Filmo 70-D, but in addition, has a built-in hand crank giving a new flexibility and versatility in 35 mm. equipment.

The turret will accommodate all lenses ordinarily employed on the Eyemo from 47 mm. lens (which is standard equipment) up to the 6½ in. lens.



LILY WHITE
1932 LTD.



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& ART PRINTING
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LILYWHITE
1932 LTD.

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BRITISH

Real Photo Print

Collogravure (Double Ink
Super Collo)

Gravure Colour Processes

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We still meet **all** Competition,
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GET LATEST TERMS,

FULLY SPECIFYING REQUIREMENTS

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Comic and Christmas Cards, and Calendars
Pictorial View Work, Postcards, etc.

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PHOTO COVER BOOKLET MATCHES

For all Businesses and Hotels

A "LILYWHITE" INVENTION

Filled with best British Safety Matches
5,000, 10,000, etc.

FREIGHTED THE WORLD OVER

<p>GUIDE BOOKS · HOTEL BOOKS · · and TARIFFS · ·</p>
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of every description

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Publishers, Chemists and Photographers in all
parts of the world will find association with the
leading Firm in Great Britain a source of profit.

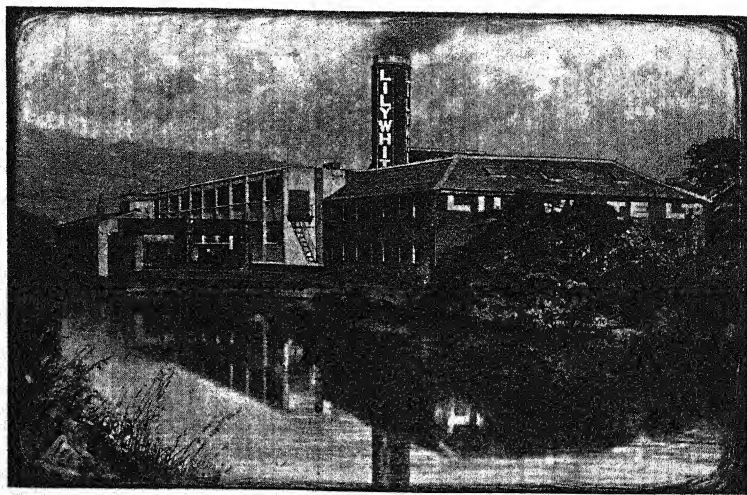
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AN INVITATION

A welcome is always waiting for all interested in photographic publicity printing, and to those interested in publishing, photographic and art printing.

We are just as interested in receiving your enquiries and to assist modern business aims as we were 30 years ago.

**Join the Round the World Trade Circle
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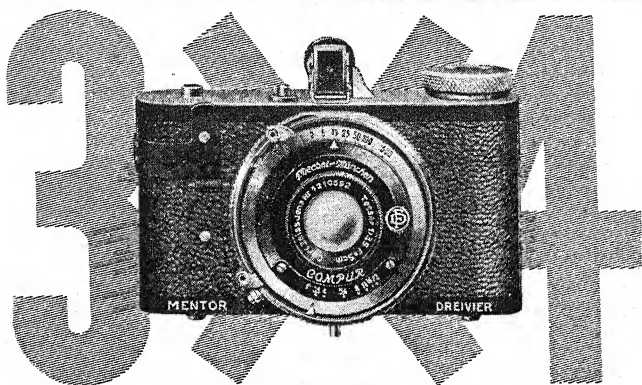
1000 COLLOGRAVURE POSTCARDS	35/-
1000 GLOSSY SEPIA POSTCARDS	42/-
500 " " "	26/-
250 " " "	18/-
1000 DE LUXE MATT SEPIA POSTCARDS	50/-
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Free copying from your print or film. Free titles. FREE POSTAGE

250 snapshot packets, 12 in., $3\frac{1}{2} \times 2\frac{3}{4}$ ", £4 15 0, with showcard, post paid.
Sells for £12 10 0.

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Half Actual Size.

NEW "MENTOR-THREEFOUR"

A small roll-film camera for 16 pictures 3 × 4 cm.

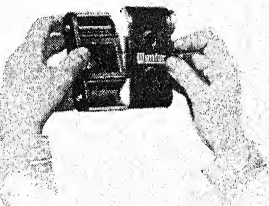
The World's Smallest, Lightest and Most Simple Camera in Use.

1. "MENTOR-THREEFOUR" is an easily carried vest pocket camera.
2. "MENTOR-THREEFOUR" weighs only 10 ozs. without lens, and about 14 ozs. with lens.
3. "MENTOR-THREEFOUR" measures only 1 × 2 × 4 inches.
4. "MENTOR-THREEFOUR" gives 16 negatives on V.P.K. film, 4 × 6.5 cm.
5. "MENTOR-THREEFOUR" is always ready for action.
6. "MENTOR-THREEFOUR" negatives have critical definition.
7. "MENTOR-THREEFOUR" enlargements from these negatives to any size.
8. "MENTOR-THREEFOUR" is for daylight-loading (no dark room required).
9. "MENTOR-THREEFOUR" fitted with latest Compur shutter and lens in focussing-mount scaled in distances—infinity 00 to 1 yard.
10. "MENTOR-THREEFOUR" gives exposures from 1 sec. to 1/300 with intermediate speeds

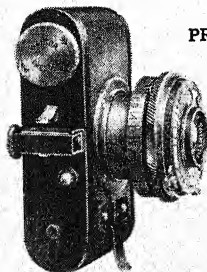
PRICES IN REICHSMARK EX DRESDEN

With Zeiss-Tessar	45 5 cm. R.M. 123
„ Zeiss-Tessar	3 5 5 cm. R.M. 138
„ Zeiss-Tessar	2 8 5 cm. R.M. 159
„ Leitz-Elmar	3 5 5 cm. R.M. 141
„ Leitz-Hektor	2 5 5 cm. R.M. 177
„ Schneider-Xenar	3 5 5 cm. R.M. 132
„ Schneider-Xenar	2 9 5 cm. R.M. 156

Light Brown Leather Case
de Luxe R.M. 7.50

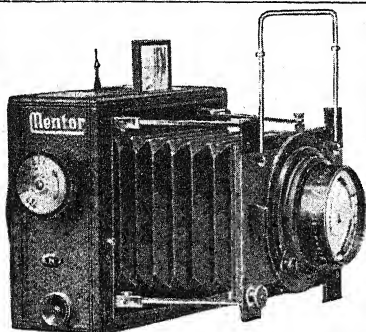


Newest Construction of a Roll-film
Camera body of maximum ease and
certainty in use.



Ready for Oblong Picture.

MENTOR CAMERA WORKS, DRESDEN, 50



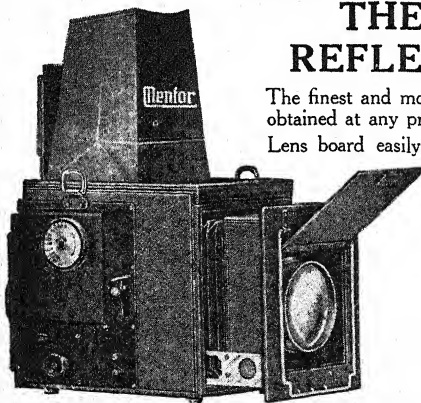
MENTOR FOCAL-PLANE CAMERA

The ideal Camera for Press, Sports and similar work. This Camera is extremely compact, light, rigid and durable, and is thoroughly reliable at all times.

Prices (in Reichsmark ex Dresden) including Lens in focussing mount, 3 Double Dark Slides and Cable Release.

Sizes Inch. Cm.		With Zeiss Tessar F/4.5			With Zeiss Tessar F/3.5			With Zeiss Tessar F/2.8		
		Camera No.	Lens Focus	R.M.	Camera No.	Lens Focus	R.M.	Camera No.	Lens Focus	R.M.
2½ × 3½	6.5 × 9	221	4½	285	5221	4½	321	0221	5½	453
3½ × 4½	8 × 10.5	223	6	330	5223	6	402	0223	6½	543
—	9 × 12	225	6	330	5225	6	402	0225	6½	543
3½ × 5½	10 × 15	228	6½	393	5228	6½	483	—	—	—
5 × 7	13 × 18	232	8½	495	5232	8½	639	—	—	—

THE MENTOR OF MENTORS THE MENTOR REFLEX DE LUXE



The finest and most up-to-date Camera that can be obtained at any price.

Lens board easily interchangeable. Lenses of ultra speed and focus. The lens is actually "housed" in the camera and is protected by an easily-working flap. The ownership of this Camera is the surest aid to perfect photography that it is possible to recommend.

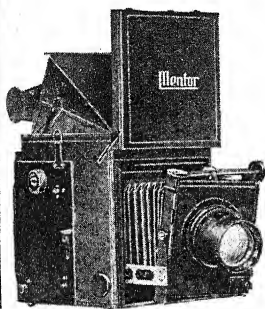
Prices (in Reichsmarks ex Dresden), including Lens in sunk mount, 3 Double Dark Slides, Cable Release and Strap.

Sizes Inch. Cm.		With Zeiss Tessar F/4.5			With Zeiss Tessar F/3.5			With Zeiss Tessar F/2.8		
		Camera No.	Lens Focus	R.M.	Camera No.	Lens Focus	R.M.	Camera No.	Lens Focus	R.M.
2½ × 3½	6.5 × 9	271	5½	543	5271	5½	588	0271	5½	687
3½ × 4½	8 × 10.5	274	6	636	5274	6	717	0274	6½	789
—	9 × 12	275	7	654	5275	6½	717	0275	6½	789

Film-pack Adapter, Automatic Changing Boxes, Roll Film Holders, Metal Slide Adapter, Metal Slides, Extra.

MENTOR CAMERA WORKS, DRESDEN, 50

THE NEW MENTOR STUDIO REFLEX CAMERA

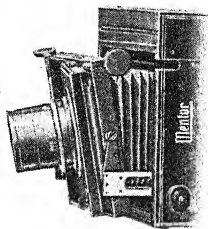


Two-fold Lens Movement permitting of considerable selective focussing.

Additional mirror and hood — subject can be viewed and focussed at eye-level.

Mentor Self-Capping Focal Plane Shutter.

Adjustable Focussing Screen.



Size.		Camera.	Price, including 3 Double Dark Slides, Metal Release and Strap.	R.M.
Inch.	Cm.	No.		
3½ × 4½	9 × 12	211	With Extension from about 8½ to 14 in.	750
—	12 × 12	212	.. .. 8½ to 14	750
5 × 7	13 × 18	213	.. .. 10 to 18	870
5 × 7	13 × 18	214	.. .. 12 to 21½ in.	990

THE NEW MENTOR STANDARD REFLEX

A REFLEX CAMERA OF SPLENDID FINISH AND RELIABILITY.

Specially adapted for Telephoto work. Extreme durability. Self-capping Focal-plane Shutter. Vibrationless. Easily handled. Perfect and Unfailing Action. With and Without Reversing Back.

With Reversing Back for Upright and Oblong.

Sizes		With Zeiss Tessar F/4.5			With Zeiss Tessar F/3.5			With Zeiss Tessar F/2.8		
		Camera No.	Lens Focus	R.M.	Camera No.	Lens Focus	R.M.	Camera No.	Lens Focus	R.M.
2½ × 3½	6.5 × 9	153	5½	423	5153	5½	468	0153	5½	567
3½ × 4½	8 × 10.5	201	6½	516	5201	6½	597	0201	6½	669
—	9 × 12	203	7	534	5203	8½	705	0203	6½	669
3½ × 5½	10 × 15	204	8½	639	5204	8½	765	—	—	—
4½ × 6½	12 × 16.5	206	8½	699	5206	8½	825	—	—	—
5 × 7	13 × 18	208	8½	699	5208	8½	825	—	—	—
5 × 7	13 × 18	210	10	828	5210	10	960	—	—	—
Without Reversing Back for Oblong.										
2½ × 3½	6.5 × 9	151	4½	357	5151	4½	381	0151	5½	507
3½ × 4½	8 × 10.5	161	6	432	5161	6	495	0161	6½	609
—	9 × 12	163	6	432	5163	6	495	0163	6½	609
3½ × 5½	10 × 15	164	6½	516	5164	6½	597	—	—	—
4½ × 6½	12 × 16.5	166	8½	639	5166	8½	765	—	—	—
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Stereo	4.5 × 10.7	181	3	447	—	—	—	—	—	—
Stereo	6 × 13	182	3½	477	5182	4½	531	0182	5½	822

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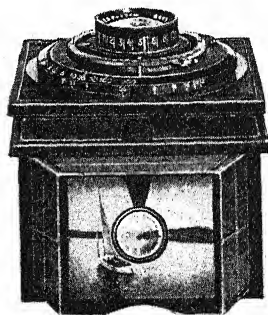
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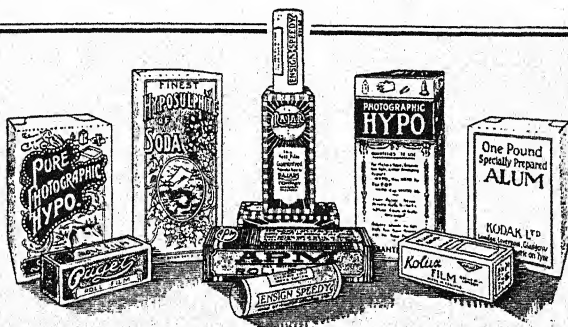
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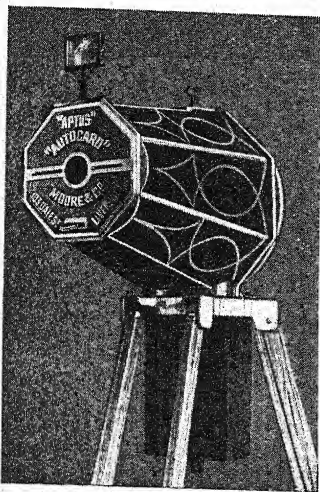
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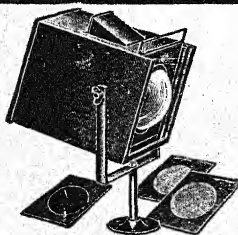
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The patent all-metal focal plane shutter—the most efficient shutter in the world, and the eye-level focussing position are but two of the innovations which put the "Duoflex" in a class by itself. The former working within 1/16th of the sensitized surface eliminates all perishable fabric blinds, tangled tapes and worn, or jammed gears, and is controlled by one dial only, with no tension to run down; the latter enables exposures to be made from either the eye or waist level view point. This model is suitable for plates, film packs and roll films and is ideal for taking sporting pictures. Weighs 2½ lbs. and measures 5½ × 5 × 4½. Size of picture 3¼ × 2¼. Fitted with 4½ F/4.5 Dallmeyer anastigmat lens and 3 single plate holders.

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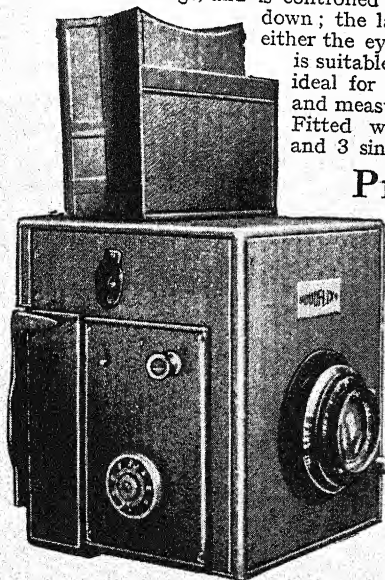


Illustration shows 'Duoflex' ready for use at waist level.

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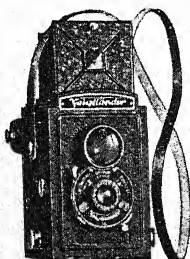
Three new introductions for 1933, together with the existing Voigtländer models,* complete a range of cameras which appeals to every photographer. The Voigtländer Co. started their business in 1756, and their success is due to the clever designs of the constructors, the technical knowledge of their highly skilled mechanics, and the enormous production possible with consequent remarkable value offered. Complete satisfaction is assured for every owner of the world's finest Cameras—Voigtländer!

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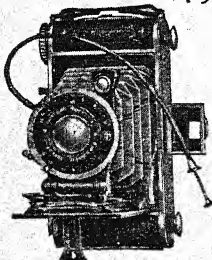
The **PERKEO**



Small and neat, strong and certain in action, the Perkeo is an ideal snapshot camera, taking 16 pictures 3×4 cm. on a V.P. film. The unique focussing wheel can be set to the distance required with the camera closed, then a pressure on the release opens the baseboard and the lens standard glides forward to the correct position. Film-spool loading is quick and certain, the film winder is of a new design, and special attention has been paid to maintaining the film in perfect register. The Perkeo should be your constant companion—a modern diary.

The prices depend upon the lens and shutter equipment: Skopar F/4.5 in Embezet delayed-action shutter, Skopar F/3.5 in Compur shutter, Heliar F/3.5 in Compur shutter.

The **BESSA F/4.5**



Fully automatic in action—a pressure on the opening catch and the baseboard drops down and the lens standard glides out in accurately ground runners. Focussing is performed by turning round the front lens mount.

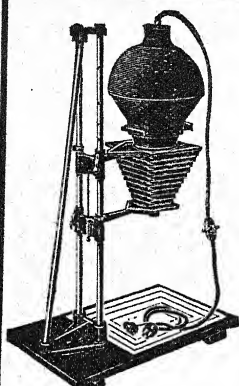
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A mask is provided to take 16 pictures $2\frac{1}{2} \times 1\frac{1}{2}$ in., or without the mask you can take $8\frac{3}{4} \times 2\frac{1}{4}$ in. pictures. Brilliant and direct-vision view-finders, an etched depth of focus table, new system of film spool-loading and winding, and a handsome appearance are features of this splendid new model, the prices of which are low in comparison with the high grade workmanship.

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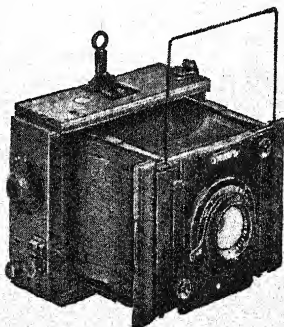
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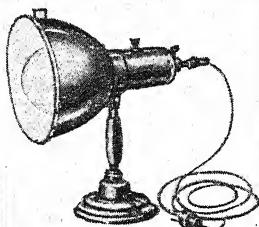
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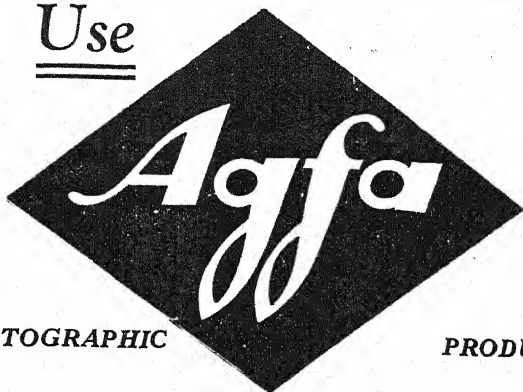
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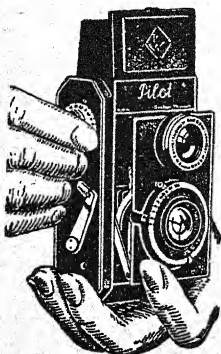
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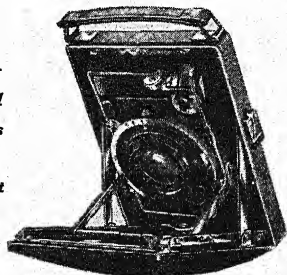
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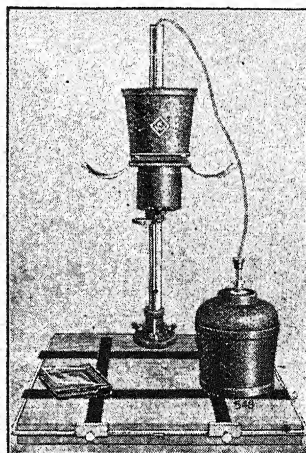
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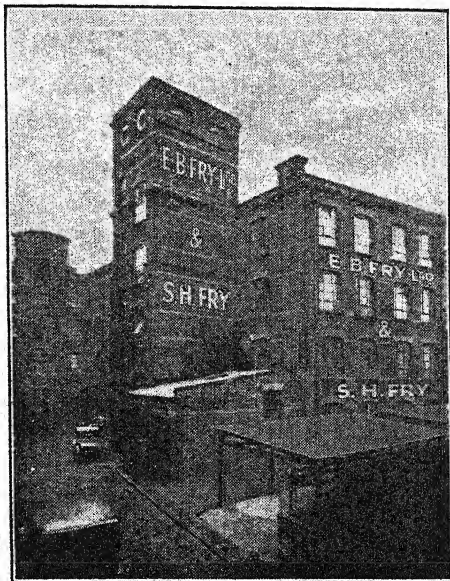
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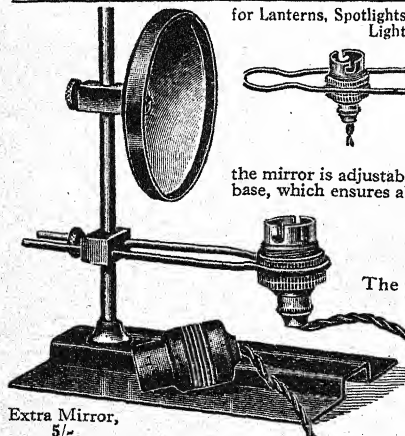
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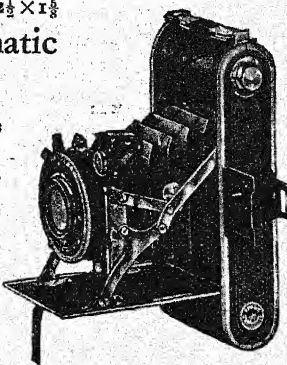
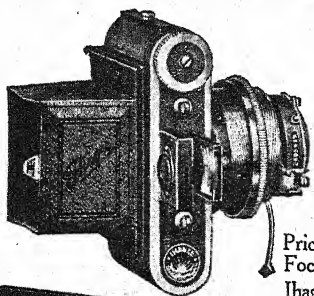
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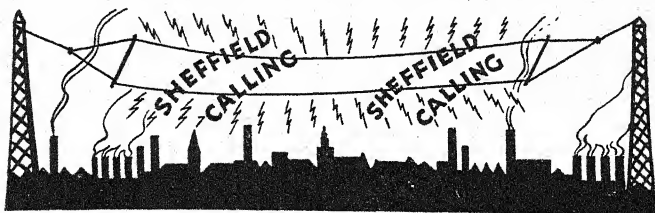
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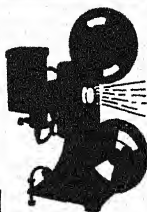
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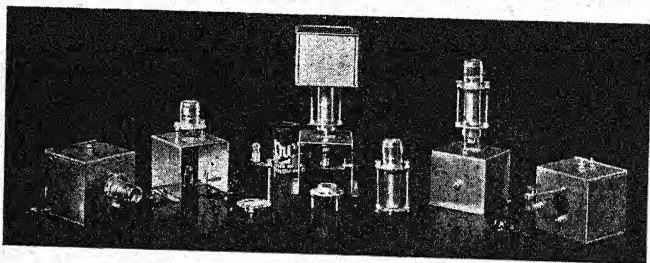


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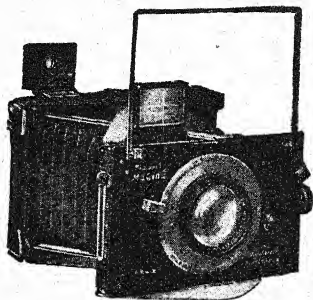
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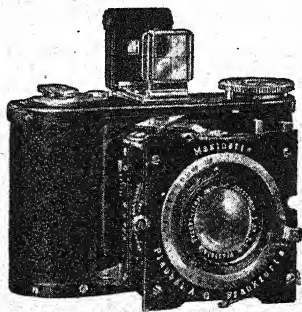
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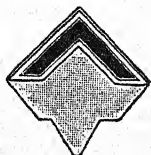
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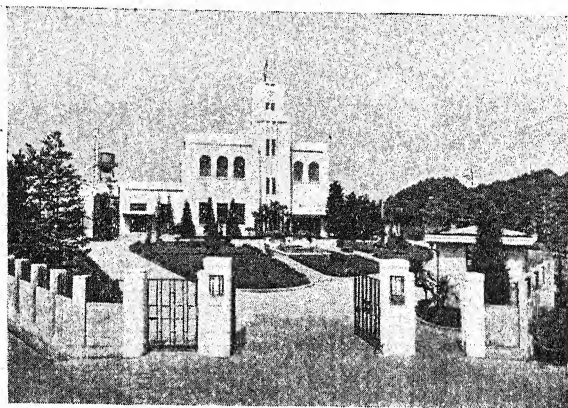
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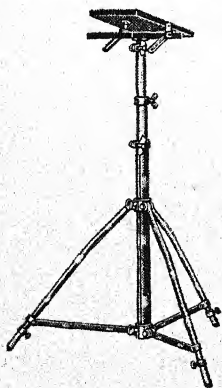
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ORTHOCHROMATISM IN PRACTICE, by C. W. Gibbs.

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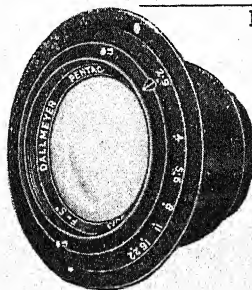
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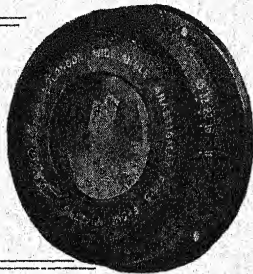


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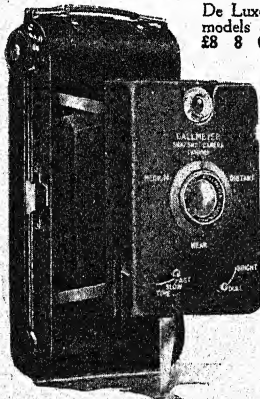
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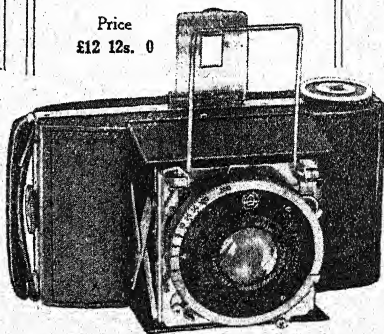


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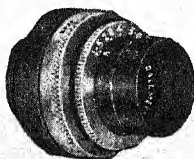
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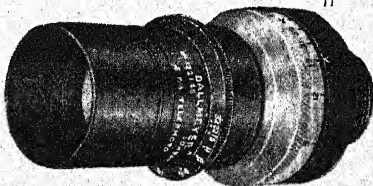
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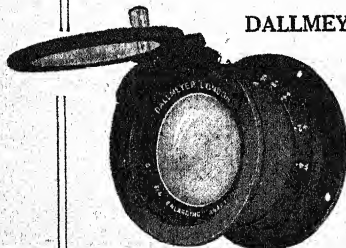
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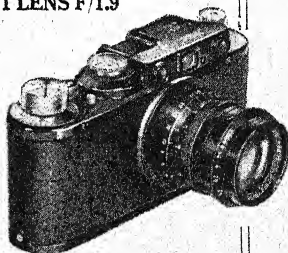
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A DIRECTORY

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Adams, A., & Co., Ltd., 122, Wignmore Street, London, W. 1. 'Phone, Welbeck 3215. Telegrams—Pyro, Wesdo, London. Factory, Englefield Road, London, N. 1.

Adams, S. R., & Co., 15, High Street, Battersea Square, London, S.W. 11. 'Phone, Battersea 0699. Telegrams—Leacamace, Batt., London.

Adherent Tissue Co., Ltd., 2, Fore Street, Upper Edmonton, London, N. 18. 'Phone, Tottenham 1660. Telegrams—Adhertisco, Totlame, London.

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Aerial Photo Co. (Peterborough Ltd.), 3-7, Oxford Road, Peterborough. 'Phone, Peterborough 766. Telegrams—Aerial, Peterborough.

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Aerograph Co., Ltd., 43, Holborn Viaduct, London, E. C. 1. 'Phone, Holborn 1257. Telegrams—Aerography, London. Also Lower Sydenham, London, S.E. 26. 'Phone 7911.

Aerostyle, Ltd., 174-176, St. John Street, Clerkenwell, London, E.C. 1. 'Phone, Clerkenwell 7963. Telegrams—Aerostyle, Smith, London.

Agfa, Ltd., 1/4, Lawrence Street, High Street, London, W.C. 2. 'Phone, Temple Bar 6101 (3 lines). Telegrams—Agfafoto, Westcent, London.

Akron, Limited, 579c, High Road, Tottenham, London, N. 17. 'Phone, Tottenham 2404. Telegrams—Akronique, Southtot, London.

Alds Bros., Sarehole Road, Sparkhill, Birmingham. 'Phone, Acocks Green 325. Telegrams—Optical, Birmingham.

Allan, David, Whitfield Works, Mansfield Street, Kingsland Road, London, E. 2. 'Phone, Bishopsgate 1317.

Allison (Morris) & Co., 155, Victoria Street, London, S.W. 1. 'Phone, Victoria 2685. Telegrams—Enillnatol, Sowest, London.

Altrincham Rubber Co., 2-4 Kingsway, Altrincham. 'Phone, Altrincham 184. Telegrams—Rubber, Altrincham.

Amateur Photographer and Cinematographer, Dorset House, Tudor Street, London, E.C. 4. 'Phone, City 2846. Telegrams—Cyclist, Fleet, London.

American Hard Rubber Co. (Britain), Ltd., 95, Hatton Garden, London, E.C. 1. 'Phone, Holborn 6037. Telegrams—Eboniseth, Smith, London.

Apem, Ltd., St. Albans Road, Watford, Heris. 'Phone, Watford 3301. Telegrams—Apem, Watford.

Army & Navy Co-operative Society, Ltd., Photographic Department, Francis Street, Westminster, London, S.W. 1. 'Phone, Victoria 8500, Extension 357. Telegrams—Army, Sowest, London.

Arnott & Co. (Leeds), Ltd., Marshall Mills, Leeds. 'Phone, 26303. Telegrams—Arnott 26303 Leeds.

Art Trade Journal, 2, Dorset Buildings, Fleet Street, London, E.C. 4. 'Phone, Central 1029.

Artesque Agency, 14-18, Emerald Street, London, W.C. 1. 'Phone, Museum 7521-7522.

Associated Photographic Printers (1932), Ltd., 37, Great Pulteney Street, London, W. 1. 'Phone, Gerrard 5335. Telegrams—Autobrom, Piccy, London.

Austin Edwards, Ltd., Coventry Road, Warwick. 'Phone, Warwick 108. Telegrams—Films, Warwick.

Automatic Coll Winder & Electrical Equipment Co., Ltd., Winder House, Douglas Street, London, S.W. 1. 'Phone, Victoria 3405-6. Telegrams—Autowinda, Churton, London.

Autotype Co., Ltd., 59, New Oxford Street, London, W.C. 1. 'Phone, Temple Bar 9331-2. Telegrams—Autotype, London; Autotype Works, Brownlow Road, West Ealing, W. 13. 'Phones, Ealing 2691 and 2692. Telegrams—Autotype, West Ealing.

Avery, W. & T., Ltd., Soho Foundry, Birmingham. 'Phone, Smethwick 1112. Telegrams—Avery, Birmingham.

Baird, Andrew H., 33-39, Lothian Street, Edinburgh. 'Phone, Edinburgh 20916. Telegrams—Radium, Edinburgh.

Baker, Charles, 244, High Holborn, London, W.C. 1. 'Phone, Holborn 1427. Telegrams—Optivorum, Westcent, London.

Ballantine, Robert, 1034, St. Vincent Street, Glasgow. 'Phone, Central 5619.

- Balmforth, J. L., 54, Derby Street, Ormskirk. 'Phone, 249. Ormskirk. Telegrams—Balmforth, Ormskirk.
- Bamforth & Co., Ltd., Station Road, Holmfirth, Yorks. 'Phone 107. Telegrams—Bamforth, Holmfirth.
- Barlow, J., & Co., 10-12, Lambeth Palace Road, London, S.E. 1. 'Phone, Hop. 5312. Telegrams—Barlassoff, Lamb, London.
- Barratt's Photo Press, Ltd., 89, Fleet Street, London, E.C. 4. 'Phone, Central 0902. Telegrams—Central 0903 London.
- Barton, Harvey & Son, Ltd., St. Michael's, Bristol. 'Phone, 21723. Telegrams—Harvey Barton, Bristol.
- Bartons' (B'ham), Ltd., Roland Road, Handsworth, Birmingham. 'Phone, Northern 3391. Telegrams—Mountable, Birmingham. Also 14, Upper Thames Street, E.C. 4. 'Phone, Central 4191.
- Bauchet, M., & Cie, 29, Red Lion Square, London, W.C. 1. 'Phone Chancery 8541. Telegrams—Zedabepeay, Holb. London.
- Bausch and Lomb Optical Co., Ltd., 67, Hatton Garden, London, E.C. 1. 'Phone Holborn 2640.
- Beagles, J., & Co., Ltd., 11, Little Britain, London, E.C. 1. 'Phone, National 4154. Telegrams—Jabee, London.
- Beard, R. R., Ltd., 10, Trafalgar Road, Old Kent Road, London, S.E. 15. 'Phone, Rodney 3138.
- Beck, R. & J. Ltd., 69, Mortimer Street, London, W. 1. 'Phone, Museum 3608. 68, Cornhill, London, E.C. 3. 'Phone, Avenue 5772. Telegrams—Objective, Wesdo, London; and Lister Works, Dickenson Street, Kentish Town, London, N.W. 5.
- Beech, Ralph, 20, Goswell Road, London, E.C. 1.
- Bell & Howell Co., Ltd., 320, Regent Street, London, W. 1. 'Phone, Langham 4376. Telegrams—Belanhowe, Wesdo, London.
- Bennett & Jennison, Ltd., Ladysmith Road, Grimsby. 'Phone, 2255. Telegrams—Novelties, Grimsby. London showrooms: Napier House, 24/27, High Holborn, W.C. 1. 'Phone, Chancery 7717.
- Bentley Photomount Co., 32, Hatton Garden, London, E.C. 1. 'Phone, Holborn 5820.
- Beresford, F., 4, Albert Bridge Road, Battersea, London, S.W. 11.
- Billcliffe's Camera Works, Richmond Street, Boundary Lane, Manchester, S.W.
- Bird, Graystone, 38, Milson Street, Bath. 'Phone, 3319. Telegrams—Bird, Photographer, Bath.
- Boots Pure Drug Co., Ltd. (Photographic Department), Stamford Street, London, S.E. 1. 'Phone, Hop 5800. Telegrams—Regesan, London.
- Boulton & Paul, Ltd., Norwich. 'Phone, 851. Telegrams—Boulton, Norwich. 139, Queen Victoria Street, London, E.C. 4. 'Phone, Central 4642. Telegrams—Boutique, Cent. London.
- Brinkman, E., 26-27, Hatton Garden, London, E.C. 1. 'Phone, Holborn 5283.
- British Camera Manufacturing Co., Ltd., 113, Queen's Road, Bayswater, London, W. 2. 'Phone, Bayswater 3636.
- British Drug Houses, Ltd., Graham Street, City Road, London, N. 1. 'Phone, Clerkenwell 3000.
- British Journal of Photography, 24, Wellington Street, Strand, London, W.C. 2. 'Phone, Temple Bar 5330. Telegrams—Photometer, Rand, London.
- British Monomarks, Ltd., Monomark House, 97, High Holborn, London, W.C. 1. 'Phone, Holborn 3663. Telegrams—Monomark, London.
- British Periodicals, Ltd., 19, Cursitor Street, London, E.C. 4. 'Phone, Holborn 6201.
- British Photographic Industries, Ltd., 88/89, High Holborn, London, W.C. 1. 'Phone, Holborn 6900.
- British Talkatone, Ltd., Wells Street, Jermyn Street, London, S.W. 1. 'Phone Whitehall 5330.
- British Xylonite Co., Ltd., Hale End, London, E. 4. 'Phone, Walthamstow 0045. Telegrams—Xylonite, London.
- Brown, F. E., & Co., Ltd., Biaby, Nr. Leicester.
- Bruce's, Ltd., 28A, Broadway, Ealing, London, W. 5. 'Phone, Ealing 1033.
- Burall Brothers, The Patent Label Factory, Wisbech, Cambs. 'Phone, Wisbech 113. Telegrams—Burall, Wisbech.
- Burr, Charles, 138, Wakefield Street, East Ham, London, E. 6.
- Burroughs Wellcome & Co., Snow Hill Buildings, London, E.C. 1. 'Phone, City 6000. Telegrams—Tabloid, Cent. London.
- Busch (Emil), Optical Co., Ltd., 37-38, Hatton Garden, London, E.C. 1. 'Phone Holborn 2208. Telegrams—Buschoptik, Smith, London.
- Canadian Kodak Company, Limited, Toronto. Telegrams—Kodak, Toronto.
- Cassio Photographic Paper Co., Ltd., Cassio Bridge, Watford, Herts. 'Phone, Watford 3482. Telegrams—Cassio, Watford.
- Cellophane Co., Ltd., 6-9, Bird Street, London, W. 1. 'Phone, Mayfair 4234. Telegrams—Cellophane, Wesdo, London.
- Chance Brothers & Co., Ltd., Glass Works, Smethwick, near Birmingham. 'Phone, West Bromwich 1306. Telegrams—Chance, Smethwick. Scottish Works, Firhill, Glasgow. 'Phone, Maryhill 98. Telegrams—Brogan, Glasgow.
- Chapman, J. T., Ltd., Albert Sq., Manchester. 'Phone, Blackfriars, 8478-9. Telegrams—Camera, Manchester.

- Church Army Lantern and Cinematograph Dept., 14, Edgware Road, London, W. 2. 'Phone, Paddington 9212. Telegrams—Landep., Edge, London.
- Cinema Traders, Ltd., 28, Church Street, Charing Cross Road, London, W. 1. 'Phone, Gerrard 5287 and 5288. Telegrams—Biocinema, Rath, London.
- City Sale and Exchange (1929), Ltd., 84, Aldersgate Street, London, E.C. 1. 'Phone, National 0591. Telegrams—Retoucher, Barb, London; 90 to 94, Fleet Street, London, E.C. 4. 'Phone, City 6981. Telegrams—Films, Fleet, London; 54, Lime Street, London, E.C. 3. 'Phone, Monument 0180. Telegrams—Phototypy, Led, London; The Arcade, Broad Street, London, E.C. 2. 'Phone, Bishopsgate 6799; 89, Cheap-side, London, E.C. 2. 'Phone, City 1124 (2 lines).
- Colour Photographs (British & Foreign) Ltd., Victoria Road, Willesden, London N.W.10. 'Phone, Willesden 7300.
- Connell, A., & Co., Ltd., Melba House, Wenlock Road, City Road, London, N. 1. 'Phone, Clerkenwell 7266. Telegrams—Nitrozone, Nordo, London.
- Construments, Ltd., 18, Gray's Inn Road, London, W.C. 1. 'Phone, Holborn 1797.
- Cook, W. F., Acme Photo Works, Chalkdon Road, Upper Caterham, Surrey. 'Phone, Caterham, 167. Telegrams—Rotaries, Caterham, Surrey.
- Cooper, Dennison & Walkden, Ltd., 7, St. Bride Street, London, E.C. 4. 'Phone, Central 4980. Telegrams—Dentags, Fleet, London.
- Coronet Camera Co., 310, Summer Lane, Birmingham. 'Phone, Aston Cross 5304/5. Telegrams—Coronetcy, Birmingham.
- Cotswold Publishing Co., Ltd., Britannia Mills, Wotton-under-Edge, Glos. 'Phone Wotton-under-Edge 93. Telegrams—Cotswold, Wotton-under-Edge.
- Criterion, Ltd., Criterion Works, Stechford, Warwickshire. 'Phone, Stechford 2007. Telegrams—Criterion, Stechford; 35, Essex Street, Strand, London, W.C. 2. 'Phone, City 7407.
- Croxley Manufacturing Co., Dominion House, Bartholomew Close, London, E.C. 1. 'Phone, National 6135.
- Daily Mirror (Photo Sales Department), Geraldine House, Rolls Buildings, Fetter Lane, London, E.C. 4. 'Phone, Holborn 4321. Telegrams—Mirror, Fleet, London.
- Dallmeyer, J. H., Ltd., 31, Mortimer Street, Oxford Street, London, W. 1. 'Phone, Museum 6022-3; Church End Works, Willesden, London, N.W. 10. 'Phone, Willesden 0176. Telegrams—Dallmeyer London.
- Dennison Manufacturing Co., Ltd., Minerva Road, Park Royal, N.W. 10, 'Phone, Willesden 6351; 52, Kingsway, London, W.C. 2. 'Phone, Holborn 2376. Telegrams—Tagservis, Phone, London.
- Dexine, Ltd., Abbey Lane, Stratford, London, E. 15. 'Phone, Maryland 2435, 4249. Telegrams—Dexine, Phone, London.
- Dickinson, John, & Co., Ltd. (Incorporating Millington & Sons, Ltd.), Apsley Mills, Hemel Hempstead, Herts. 'Phone, Boxmoor 124. Telegrams—Dickinson, Apsley End.
- Dixon, T. H., & Co., Ltd., Letchworth, Herts. 'Phone, Letchworth 165. Telegrams—Theko, Letchworth.
- Dollond & Altholson, Ltd., 192, Tottenham Court Road, London, W. 1. 'Phone, Museum 6402-3. Telegrams—Owl, London.
- Doughtys, Ltd., 47-48, Savile Street, Hull. 'Phone, Central 31666. Telegrams—Recreative, Hull; also 10, Whitefriargate, Hull. Central 36466.
- Drem Products, Ltd., 37, Bedford Street, Strand, London, W.C. 2. 'Phone, Temple Bar 2340. Telegrams—Dremcorp, Lesquare, London.
- Econasign Co., Ltd., 92, Victoria Street London, S.W. 1. 'Phone, Victoria 5662.
- Edgington, John, & Co., Ltd., Sardinia House, Sardinia Street, Kingsway, London, W.C. 2. 'Phone, Holborn 0734. Telegrams—Abri, Holb, London.
- Edison Swan Electric Co., Ltd., 123-125, Queen Victoria Street, London, E.C. 4. 'Phone, City 9881. Telegrams—Ediswan, London.
- Electric Fires, Ltd., Norwich. 'Phone, Norwich 1537. Telegrams—Heatrae, Norwich.
- Elliot & Sons, Ltd., Barnet, Herts. 'Phone, Barnet 0011. Telegrams—Elliot, Barnet.
- Empire Background Co., Bury Court Studios, Oswaldtwistle, Accrington, Lancs.
- Ensign, Ltd., Ensign House, 88/89, High Holborn, London, W.C. 1. 'Phone, Holborn 6900. Telegrams—Bromide, Phone, London. Works: Walthamstow, E. 17. Branches: Glasgow, Leeds, Manchester, Nottingham, Swansea, Exeter, Southampton, Birmingham, Ipswich, Canterbury, Belfast, and at Bombay and Calcutta.
- Epteln, J., & Co., 7-11, Milk Street, Bristol. 'Phone, 25793. Telegrams Mouldings, Bristol; also, 105, Mansion House Chambers, Queen Victoria Street, London, E.C. 4. 'Phone, City 6111.
- E.S.S. Colour Filter Co., 22, Bloomsbury Street, London, W.C. 1. 'Phone Museum 2161.
- Ever Ready Co. (Great Britain), Ltd., Hercules Place, Holloway, London, N. 7. 'Phone, Archway 3030 (11 lines), Telegrams—Eveready, Hoiway, London.

- Fallowfield, Jonathan, Ltd., 61-62, New man Street, Oxford Street, London, W. 1. 'Phone, Museum 8318. Telegrams—Fallowfield, Rath, London.
- Farrow, E. H., 84, Hazelville Road, Hornsey Rise, London, N. 19.
- Finlay Colour, Ltd., 20, Conduit Street, London, W. 1. 'Phone, Mayfair 3337. Telegrams—Fintocess, Piccy, London.
- Flatters & Garnett, Ltd., 309, Oxford Road, Manchester. 'Phone, Ardwick 3533. Telegrams—Slides, Manchester.
- Fordham & Co., Ltd., Victoria Works, Victoria Road, Walthamstow, London, E. 17. 'Phone, Walthamstow 0244. Telegrams—Permanent, Phone, London.
- Forrest, T. W., 46, Addington Road, London, E. 3. 'Phone, East 4262.
- Fotef Camera Co., 18, Cross Street, Hatton Garden, London, E. C. 1. 'Phone, Holborn 2510.
- Fountain Press, 19, Cursitor Street, London, E. C. 4. 'Phone, Holborn 6201.
- Fourmiller, Hunt & Co., 8, Chingford Mount Road, London, E. 4. 'Phone, Silverthorn 2241.
- Foyle, W. & G., Ltd., 119-125, Charing Cross Road, London, W. C. 2. 'Phone, Gerrard 5660. Telegrams—Foylibra, Westcent, London.
- Froggatt, H. J., Cronwell House, Fulwood Place, High Holborn, London, W. C. 1. 'Phone, Chancery 7054 (two lines). Telegrams—Froggatt Jamarker Holb, London.
- Frost & Reed, Ltd., 10, Clare Street, Bristol. 'Phone, 20765. Telegrams—Frost & Reed, Bristol; 26c, King Street, St. James', London, S.W. 1. 'Phone, Whitehall 6581.
- Fry, E. B., Ltd., Malden Factories, Malden Crescent, Kentish Town, London, N.W. 1. 'Phone, Gulliver, 4025. Telegrams—Frylant, Norwest, London.
- Fry, S. H., Malden Factories, Malden Crescent, Kentish Town, London, N.W. 1. 'Phone, Gulliver 4053. Telegrams—Frylant, Norwest, London.
- Furse, W. A., 27, Chancery Lane, London, W. C. 2. 'Phone, Holborn 6895.
- Gandolfi, Louis & Sons, 2, Borland Road, Stuart Road, Peckham Rye, London, S.E. 15.
- Garner & Jones, Ltd., Polebrook House, Golden Square, London, W. 1. 'Phone, Gerrard 2300. Telegrams—Diamido, Piccy, London.
- Garratt & Atkinson, Warwick Works, Ealing, London, W. 5. 'Phone, Ealing 1760. Telegrams—Atkingarr, Phone, London.
- Gask, Arthur, & Co., 50, Mortimer Street, London, W. 1. 'Phone, Museum 0337.
- Gear, John H., 8, Nottingham Terrace, Marylebone Road, London, N.W. 1. 'Phone, Welbeck 2204.
- General Electric Co., Ltd., Magnet House, Kingsway, London, W. C. 2. 'Phone, Temple Bar 8000. Telegrams—Electricity, Westcent, London.
- Gevaert, Ltd., 115, Walmer Road, North Kensington, London, W. 10. 'Phone, Park 4333 (2 lines). Telegrams—Artoveg, Nottarch, London.
- Gibson, C. M., 15, Charles Street, Hatton Garden, London, E. C. 1. 'Phone, Holborn 0800.
- Glanvill, H. G., 256, Balsall Heath Road, Birmingham.
- Glasgow Camera Exchange, 99, Waterloo Street, Glasgow, C. 2. 'Phone, Central 5447.
- Glazine Pad Co., Oughtibridge, near Sheffield.
- Glossoid Co., Ltd., 19/21, Tavies Inn, London, E. C. 1. 'Phone, Central 6526.
- Graber, Ellis, 16, Newton Road, Tunbridge Wells. Telegrams—Graber, Tunbridge Wells.
- Grant, Thos. K., Ltd., Polebrook House, Golden Square, London, W. 1. 'Phone, Gerrard 2300. Telegrams—Diamido, Piccy, London.
- Greiff, R. W., & Co., Ltd, Thames House, Queen Street Place, London, E. C. 4. 'Phone, City 6550 (8 lines). Telegrams Greiff, Cannon, London.
- Green, A. W., 70, High Holborn, London, W. C. 1. 'Phone, Chancery 7004. Telegrams—Green, Chancery 7004.
- Greenwood, Henry, & Co., Ltd., 24, Wellington Street, Strand, London, W. C. 2. 'Phone, Temple Bar 5330. Telegrams—Photometer, Rand, London.
- Griffin & Tatlock, Ltd., Kemble Street, Kingsway, London, W. C. 2. 'Phone, Temple Bar 2621 (3 lines). Telegrams—Gramme, Westcent, London.
- Griffiths Bros. & Co., London, Ltd., Macks Road, Bermondsey, London, S.E. 16. 'Phone, Bermondsey 1151-1153. Telegrams—Aqual, Phone, London.
- Griffiths, R., 26-31, Eyre Street Hill, Holborn, London, E. C. 1. 'Phone, Clerkenwell 5867. Telegrams—Eyragrif, Holb, London.
- Gulterman, S., & Co., Ltd., 35 and 36, Aldermanbury, London, E. C. 2. 'Phone, Metropolitan 8074. Telegrams—Gulterman, Phone, London.
- Gulliman, Granville & Co., 29, Warwick Place, Leamington Spa. 'Phone, 847. Telegrams—Granville, Leamington. 57-58, Chancery Lane, W. C. 2. 'Phone and Telegrams—Chancery 8537; and 174, Corporation Street, Birmingham. 'Phone and Telegrams—Central 2482.
- Halliday & Co., Holbeck New Mills, Holbeck Lane, Leeds. 'Phone, Leeds 22251. Telegrams—Halmac, Leeds.
- Hamel, E., & Co., Premier Studios, Palmerston Street, Woodborough Road, Nottingham. 'Phone, 41547 (2 lines). Telegrams—Hamel, Nottingham.

- Harbutt's Plastiline, Ltd.**, Bathampton, Bath. 'Phone, 8209. Telegrams—Plastiline, Bath; London Office and Showroom, 56, Ludgate Hill, E.C. 4. 'Phone, City 7382.
- Hardtmuth, L. & Co.**, 29, Kingsway, London, W.C. 2. 'Phone, Temple Bar 3743.
- Harper Automatic Machine Manufacturing Co., Ltd.**, Automatic Works, Stafford Road, Waddon, Croydon. 'Phone, Fairfield 5571 & 5572. Telegrams—Fairfield 5571.
- Harrap, John, & Son**, 3, Holborn Buildings, Holborn Bars, London, E.C. 1. 'Phone Holborn 2020. Telegrams—Harrapart, Smith London.
- Harrington Bros., Ltd.**, 4, Oliver's Yard, 53A, City Road, London, E.C. 1. 'Phone, Clerkenwell 1007. Telegrams—Siccative, Finsquare, London.
- Harringtons, Ltd.**, 386, George Street, Sydney, N.S.W.; also Katonaba, Newcastle, Melbourne, Brisbane, Adelaide, Perth and Hobart, Australia; also Wellington and Auckland, New Zealand. Cables—Harrington, Sydney.
- Harrods** Knightsbridge, London, S.W. 1. 'Phone, Sloane 1234. Telegrams—Harrods, Everything, London.
- Haseler, Charles & Son, Ltd.**, 390-395, New John Street West, Birmingham, 19. 'Phone Telegrams—Aston Cross 0631, Birmingham.
- Hathern Station Brick & Terra Cotta Co., Ltd.**, Loughborough, Leicestershire, 'Phone, Hathern 61. Telegrams—Bricks, Loughborough.
- Heaton Wallace, Ltd.**, 119, New Bond Street, London, W. 1. 'Phone, Mayfair 0924-5-6; also 47, Berkeley Street, W. 1. 'Phone, Grosvenor 2691. Telegrams—Zodellaria, Wesdo, London, Works and Studios, 28-30, Avery Row, London W. 1.
- Hesketh, R.**, 65, Westgate, Hale, Altrincham. 'Phone, Altrincham 1062. Telegrams—Hesketh, Altrincham 1062.
- Hewitt Electric Company, Ltd.**, Walton-on-Thames, Surrey. 'Phone, Walton-on-Thames 782, 763. Telegrams—Hewitt, Walton-on-Thames.
- Higgins, C. M., & Co., Ltd.**, 16-20, Farringdon Avenue, London, E.C. 4. 'Phone, Central 0801. Telegrams—Plicated, Fleet, London.
- Hilger, Adam, Ltd.**, 98, Kings Road, Camden Road, London, N.W. 1. 'Phone, Gulliver 5426. Telegrams—Sphericity, 'Phone, London.
- Hockett, S. W.**, Photographic Works, Potters Road, New Barnet, Herts. 'Phone, Barnet 0158.
- Hodgson, E. O.**, 127, Pinstone Street, Sheffield. 'Phone, 23889 Sheffield.
- Holmes Brothers (London), Ltd.**, Howard Works, Billet Road, Walthamstow, London, E. 17. 'Phone, Walthamstow 1340 (3 lines). Telegrams—Dogfish, Phone, London.
- Holophane, Ltd.**, Elverton Street, Westminster, London, S.W. 1. 'Phone, Victoria 8062. Telegrams—Holophane, Sowest, London.
- Hood & Co., Ltd.**, Sanbride Press, and 9/, Albert Road, Middlesbrough, 'Phone, 2518. Telegrams—Sanbride, Middlesbrough.
- Hora, Tudor T.**, 346, York Road, Wandsworth, London, S.W. 18. 'Phone, Battersea 0327. Telegrams—Hora, Chemist, Wandsworth, London.
- Horne's Camera Mart**, 58, Old Broad Street, E.C. 2, and 32, Gracechurch Street, London, E.C. 3. 'Phone, Wall 6336. Telegrams—London Wall 6336.
- Houghton-Butcher Manufacturing Co., Ltd.**, Fulbourne Road, Walthamstow, London, E. 17. 'Phone, Walthamstow 0080. Telegrams—Rhamnus, Phone, London.
- Howell, Charles**, Promenade and Bonny Street, Blackpool.
- Hugh Cecil Portraits, Ltd.**, 5, Grafton Street, London, W. 1. 'Phone, Regent 3461.
- Hughes, W. C., & Co.**, Brewster House, 82, Mortimer Road, Kingsland, London, N. 1. 'Phone, Clissold 1122.
- Hunter, R. F., Ltd.**, Celfix House, 51, Gray's Inn Road, London, W.C. 1. 'Phone, Holborn 7311-2. Telegrams—Buxhunter, Holb. London.
- Hunter-Fenrose, Ltd.**, 108, Farringdon Road, London, E.C. 1. 'Phone, Clerkenwell 6626. Telegrams—Huntomatic, Smith, London. 51, International Exchange, Church Street, Birmingham. 'Phone, Central 7427; 45A and 47, Market Street, Manchester. City 2169; 349, Cathedral Street, Glasgow. 'Phone, Bell 1405. 2, Leonard Lane, Bristol. 'Phone 24662.
- Ilford, Limited**, Ilford, London. 'Phone, Ilford 3000 (20 lines). Telegrams—Plates, Phone, Ilford.
- Illingworth, Thos., & Co., Ltd.**, Cumberland Avenue, Park Royal, Willesden Junction, London, N.W. 10. 'Phone, Willesden 2384. Telegrams—Squeegee, 'Phone, London.
- Imperial Dry Plate Co., Ltd.**, Cricklewood, London, N.W. 2. 'Phone, Gladstone 4286 (3 lines). Telegrams—Impeple, Crickle, London.
- Infalible Exposure Meter Co.**, Wrexham. 'Phone, Coedpoeth 26. Telegrams—Infalible Exposure, Coedpoeth.
- I.P.A. Photographics**, 10-12, Lambeth Palace Road, London, S.E. 1. 'Phone, Hop 5312-3. Telegrams—Barlassoff, Lamb, London.
- Janovitch, M., & Co.**, 19, Broad Street, Golden Square, London, W. 1. 'Phone,

- Gerrard 2202. Telegrams—Uniplates, Piccy, London.
- Jeffery & Boarder, 55 and 56, Mattock Lane, West Baling, London, W. 13. 'Phone, Ealing 0875.
- Jepson, Warren & Co., Regent Works, off Hyde Park Road, Leeds. 'Phone, 26294. Telegrams—Jepson, Regent Works, Leeds.
- Johnson & Sons, Manufacturing Chemists, Ltd., Hendon, London, N.W. 4. 'Phone, Hendon 8051 (3 lines). Telegrams—Caustic, London. Manchester Office, 12, Queen Street, Deansgate. 'Phone, Blackfriars 0115. Telegrams—Caustic, Manchester.
- Johnson & Sons, Smelting Works, Ltd., Creek Works, Brimsdown, Middlesex. 'Phone, Enfield 1677 (3 lines). Telegrams—Cauterism, Enfield.
- Johnson, Fredk., & Co., Ltd., 202, Upper Thames Street, London, E.C. 4. 'Phone, City 2637-8-9. Telegrams—Usapacol, Cent, London.
- Johnson Matthey & Co., Ltd., 73/82, Hatton Garden, London, E.C. 1. 'Phone, Holborn 6989. Telegrams—Matthey, Smith, London.
- Johnson, Wm., & Sons (London), Limited, 18, Union Street, Southwark, London, S.E. 1. 'Phone, Hop 4950.
- Jones, Samuel, & Co., Ltd., Bridewell Place, London, E.C. 4. 'Phone, City 9407. Telegrams—Noncurling, Lud, London.
- Jones, W. H., & Co., Small Street, Ardwick, Manchester. 'Phone, Ardwick, 2762/3.
- Kamm & Co., Ltd., 27, Powell Street, Goswell Road, London, E.C. 1. 'Phone, Clerkenwell 6595. Telegrams—Zerograph, Isling, London.
- Kamy, Ltd., 28, Bunhill Row, London, E.C. 1. 'Phone, National 1508.
- Kandem Electrical, Ltd., 711-715, Fulham Road, London, S.W. 6. 'Phone, Fulham 2387-8. Telegrams—Kortmath, Walgreen, London.
- Kaufmann, Simon, 20-21, Tottenham Mews, Tottenham Street, London, W. 1. 'Phone, Museum 4674.
- Kentmere, Ltd., Staveley, Westmorland. 'Phone, Staveley 65. Telegrams—Kentmeres, Staveley, Westmorland.
- Kershaw, A., & Son, 200, Harehills Lane, Leeds. 'Phone Chapeltown 41081-2. Telegrams—Science, Leeds.
- Kodak, Limited, Kingsway, London, W.C. 2. 'Phone, Holborn 7841. Telegrams—Kodak, London. Works, Wealdstone, Middlesex. 'Phone, Harrow 0080. Telegrams—Kodak, Wealdstone; 70, Lord Street, Liverpool. 'Phone, Bank, 3412. Telegrams—Kodak, Liverpool; 46, Buchanan Street, Glasgow. 'Phone, Central 8011. Telegrams—Kodak, Glasgow; 32, Grainger Street, Newcastle-on-Tyne. 'Phone, 1674. Telegrams—Kodak, Newcastle-on-Tyne; 45, Corporation Street, Birmingham. 'Phone, Central 1940. Telegrams—Kodak, Birmingham; 89, Grafton Street, Dublin. 'Phone 1798. Telegrams—Kodak, Dublin.
- Kodak, Limited, Kodak House, Hornby Road, Bombay. Telegrams—Kodak, Bombay. Branches:—Calcutta, Madras and Lahore.
- Kodak, Limited, 130, Robinson Road, Singapore. Telegrams—Kodak, Singapore.
- Kodak, Limited, Noordwyk 38, Batavia Centrum, D.E.I., Soerabaya and Medan, Sumatra.
- Kodak (Australasia) Proprietary, Ltd., Melbourne. Telegrams—Kodak, Melbourne: Sydney, Adelaide, Brisbane, Perth, Toowoomba, Townsville and Rockhampton, Australia; Hobart, Tasmania.
- Kodak, New Zealand, Ltd., 16-18, Victoria Street, Wellington, N.Z. Telegrams—Kodak, Wellington, N.Z. Branches:—Auckland, Dunedin and Christchurch.
- Kodak (East Africa), Ltd., Zebra House, P.O. Box 28, Nairobi. Branches:—Kenya Colony: Kitale, Eldoret, Nakuru and Mombasa; Uganda: Kampala and Jinja; Tanganyika: Dar-es-Salaam, Arusha, Tanga and Hoshi.
- Kodak (South Africa), Ltd., Kodak House, Corner of Shortmarket and Loop Street, Cape Town. Telegrams—Kodak Cape Town. Branches:—Durban and Johannesburg.
- Kosmos Photographies, Ltd., Letchworth, Herts. 'Phone, 128. Telegrams—Kosmos, Letchworth; also 155, Victoria Street, London, S.W. 1. 'Phone, Victoria 2685.
- Kuntzen, H., 33, White Lion Street, Bishopsgate, London, E. 1. 'Phone, Bishopsgate 1991. Telegrams—Gambadoes, Ald, London.
- Lancashire Ferrottype Co., Masonic Hall Buildings, Adelaide Street, Blackpool.
- Lancaster, J., & Son, Ltd., 87, Parade Birmingham. 'Phone, Central, 4255. Telegrams—Lancaster, Parade, Birmingham.
- Lea & Son, Oxygen Works, Runcorn, Cheshire. 'Phone 1, Telegrams—Lea, Oxygen, Runcorn.
- Leitz, E. (London), 20, Mortimer Street, London W. 1. 'Phone, Museum 3776-7. Telegrams—Microtome, Phone London.
- Lennon Limited, 12 and 14, Lafone Street, Tower Bridge, London, S.E. 1. 'Phone, Hop 5594. Telegrams—Lennonibus, Boroh, London.
- Lilywhite, Limited, Mearclough, Sowerby Bridge, W. Yorks. 'Phone, Sowerby Bridge 81271 (2 lines). Telegrams—Lilywhite, Mearclough, Sowerby Bridge.
- Lizars, J., 101-107, Buchanan Street, Glasgow. 'Phone, Central 8062. 381

- Sauchiehall Street, Glasgow. 'Phone' Douglas 1669. Telegrams—Lizars, Glasgow; Factory, Glasgow; 6, Shandwick Place, Edinburgh. 'Phone, 22272. Telegrams—Optical, Edinburgh; Union Street, Aberdeen. 'Phone, 2324. Telegrams—Lizars, Optician, Aberdeen; 71, Bold Street, Liverpool. 'Phone, Royal 1882. Telegrams—Lizars, Optician, Liverpool; 27, High Street, Paisley. 'Phone, 2238. Telegrams—Lizars, Optician, Paisley; 14, West Blackhall Street, Greenock. 'Phone, 877. Telegrams—Lizars, Optician, Greenock; 12, Muir Street, Motherwell. 'Phone, 68. Telegrams—Lizars, Opticians, Motherwell; 8, Wellington Place, Belfast. 'Phone, 1028. Telegrams—Lizars, Belfast.
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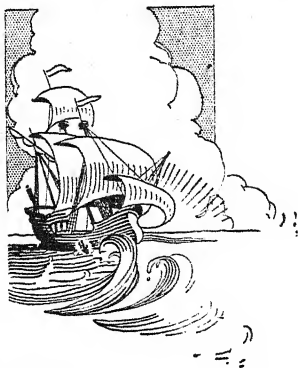
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